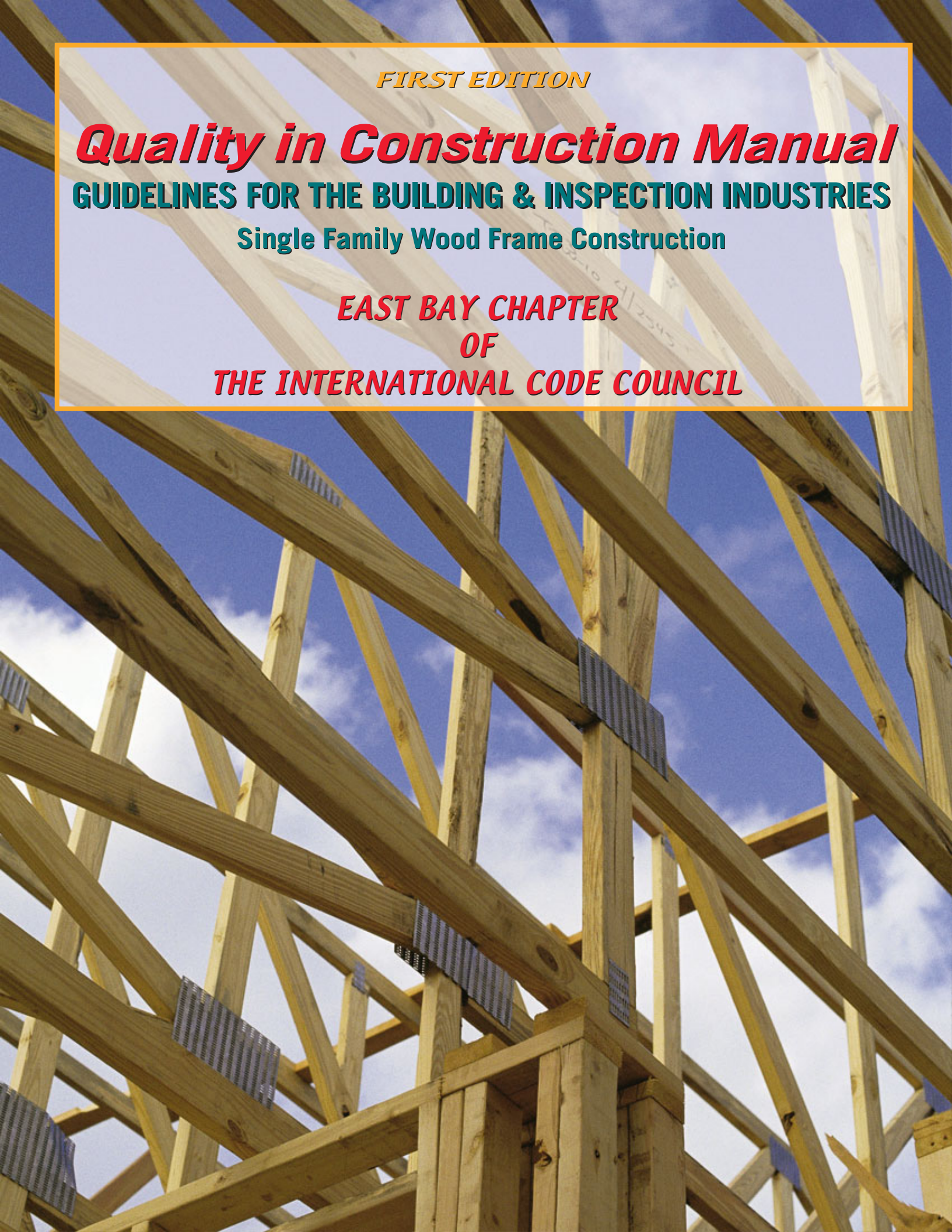

FIRST EDITION

Quality in Construction Manual

GUIDELINES FOR THE BUILDING & INSPECTION INDUSTRIES

Single Family Wood Frame Construction

EAST BAY CHAPTER
OF
THE INTERNATIONAL CODE COUNCIL

Quality in Construction Manual

East Bay Chapter ICC

EAST BAY CHAPTER ICC

The East Bay Chapter of the International Code Council represents many of the building departments in the San Francisco East Bay. Its members include building officials, inspectors, engineers, architects and industry representatives. The East Bay Chapter is actively involved in the code development process, the improvement of the quality of construction and as a service to the construction industry, sponsors educational seminars throughout the year for building department personnel and industry members.

All references to East Bay Chapter shall mean East Bay Chapter of ICC.

The East Bay Chapter can be contacted at: www.eastbayicc.org

INTERNATIONAL CODE COUNCIL

The International Code Council (ICC) was established in 1994 as a nonprofit organization dedicated to developing a single set of comprehensive and coordinated national model construction codes. It was formed out of the efforts and desires of the three major code making authorities in the United States, The Building Officials and Code Administrators International, Inc., (BOCA), The International Conference of Building Officials (ICBO), and The Southern Building Code Congress International, Inc. (SBBCCI). Since the early 1900's, these three organizations developed regional model codes that have been the standard for construction throughout the United States. Realizing the need for one uniform set of building codes that can be used not only nationally, but also internationally, BOCA, ICBO, and SBCCI joined together and formed the ICC.

For more information, the ICC can be contacted at:
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Quality in Construction Manual

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The following codes are referenced in this manual:

1997 Uniform Building Code
2000 Uniform Mechanical Code
2000 Uniform Plumbing Code
1999 National Electrical Code

A Special Note to the Reader

ICC Quality in Construction Manual

The East Bay Chapter's intention in creating this manual is to provide a document that explains commonly misunderstood requirements of the building codes in simple language that can be used and understood by contractors and inspectors in the field.

The significance of this manual is that it is designed to be expanded and refined as time goes on and code requirements change. It is hoped that individuals reading or using this manual will offer input and suggestions to make it a better tool and reference for the construction industry. We are open to any comments or suggestions. If you believe that additional code or construction information improving the quality of construction should be included in future publications of this manual, please contact the East Bay Chapter, Quality in Construction Committee.

Inquires and suggestions can be sent to:

Quality in Construction Committee
C/O East Bay Chapter ICC at
www.eastbayicc.org

All proposals will be reviewed and considered by the Committee for inclusion in future editions of this manual.

To purchase additional copies of this manual, please contact the East Bay Chapter at www.eastbayicc.org

INTRODUCTION

Quality in Construction Manual

For the past few years, the East Bay Chapter of the International Code Council (ICC) has been discussing ways to improve the quality of construction in wood-frame single-family homes. Specifically, Chapter members believed that assisting contractors and trade personnel in better understanding code requirements would achieve dual goals:
The quality of construction would improve.
The number of corrections for noncompliance would be reduced, thus saving the builder time and money.

To lead this effort, the Chapter formed a committee consisting of engineers, designers, inspectors, and contractors. As a first step, the committee surveyed East Bay cities and counties to compile a list of the most commonly missed items found when inspecting wood-frame construction. The survey results included all aspects of building a house, from grading and drainage to the items checked on final inspection. Once the results were tabulated, the committee took the time to relate each survey item to the proper code section, and provided additional information to assist contractors, architects, and engineers in meeting code requirements and achieving compliance for their work.

Illustrations were added to supplement the information, detailing the proper installation of framing members, foundation hold-downs, shear panels and load path connections. Checklist were added to assist in the inspection of the plumbing, mechanical and electrical systems. Although these illustrations and checklist are based on commonly accepted practices, they have been added for educational purposes only. They are not intended to be used in lieu of details on approved drawings.

This manual is the East Bay Chapter's first step toward the goal of achieving a uniform understanding of code requirements for the construction industry. By reviewing the information in the manual, we believe builders and contractors will be able to understand the code requirements as well as the logic behind them. Having this knowledge they will be better prepared for their inspections, while at the same time will reduce their costs by achieving code compliance in a timely manner.

Clearly, the road to quality construction does not end with the publication of this manual. It will require the continuous commitment of the building industry and regulatory agencies, working together toward this common goal. Users of this manual are encouraged to become part of this journey toward quality construction of wood-frame houses. It is hoped users of this manual will share additional suggestions and ideas for improving the construction or inspection process with the East Bay Chapter for inclusion in future publications.

ACKNOWLEDGMENTS

The East Bay Chapter would like to acknowledge the members of the Quality in Construction Committee for donating their time and for their commitment to this project. Without their input, this project would never have started, nor developed as well as it has.

Massoud Abolhoda, Building Official of the City of Fremont, Committee Chair

Don Rhoades, retired Building Official of San Ramon

Jeff Rice, of Jeffrey Rice and Associates, a building designer in Oakland

John R. Schneider, of All About Homes, Inc., a code and construction consulting company in Hayward

Gary Smith, retired Building Official, City of Pleasanton

John Ward, of M. J. Ward and Associates, a general contracting and consulting firm in Danville

Sharon Waterman, of Interactive Resources, an architectural and engineering firm in Richmond

CONTRIBUTING ORGANIZATIONS

Several groups and organizations have provided information for the illustrations and checklists in this manual. The East Bay Chapter would like to thank *Applied Technology Center* (ATC), *The City of Fremont*, *The City of Pleasanton*, and *The City of Los Angeles* for providing this information.

The East Bay Chapter would also like to thank the *ICC Penisula Chapter* for their monetary contribution towards this manual.

The Chapter would like to thank Ron Richards, for the creation of the illustrations, overall design and professional appearance of this manual.

The East Bay Chapter would like to extend special thanks to Massoud Abolhoda and John R. Schneider for their initiative and commitment to the successful completion of this project.

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- Drainage
- Grading
- Silt control
- Footing excavation
- Slab thickness
- Special inspection post tensioned slabs
- Tendon coverage
- Landscaping
- Slopes

SITE WORK

COMMON CONSTRUCTION ERRORS	DESCRIPTION / DISCUSSION
PAD ELEVATION INCORRECT.	Foundations or slabs supporting wood shall extend 6" above the finished grade. *Refer to UBC Section 1806.1*
DRAINAGE FROM IMPERVIOUS SURFACES INADEQUATELY ADDRESSED.	Runoff from impervious surfaces can collect onto site pad and ponding can cause settlement to structures. All water runoff must drain to an approved discharge and away from any structure. See fig.2.2 on page 11. *Refer to UBC Section 1804.7 and 1806.5.5*
APPROVED GRADING ALTERED BY LANDSCAPING.	Revisions to the approved grading can adversely affect the drainage and may delay final approval. *Refer to UBC Section 1804.7*
EROSION PREVENTION AND SEDIMENT CONTROL MEASURES NOT IN PLACE.	Required by State environmental laws; Construction related erosion and sedimentation can cause problems for down hill property owners. Uncontrolled erosion is costly, violates State pollution laws, exposes developers, contractors and landowners to legal liabilities. *(For further information, contact the California Regional Water Control Board, San Francisco Region)*
FOOTING EXCAVATION NOT FREE FROM LOOSE MATERIAL.	Minimum depth shall be at least 12” below natural grade and shall be free of debris and roots. *Refer to UBC Section 1905.7*
INADEQUATE REINFORCEMENT, SLAB THICKNESS.	Non-compliance with the approved plans and specifications. *Refer to UBC Section 2104.5*
SPECIAL INSPECTION NOT PERFORMED FOR POST TENSIONED SLABS.	Special inspection is required for post tensioned slabs. *Refer to UBC Section 1701.3 and 1701.5*
INADEQUATE TENDON COVERAGE AROUND OPENINGS IN POST TENSION SLAB (I.E.: BLOCK OUT FOR SHOWER DRAIN TAP).	The tendon coverage shall comply with the approved plans and specification. *Refer to UBC Section 1907.6.7 and 1907.7.3.1*
LANDSCAPING.	Landscaping is necessary if it is part of plan approval. *Refer to UBC Section 106.4.1 & Conditions of Approval.*
FLAT-WORK SLOPES WRONG WAY.	It is recommended all flatwork adjacent to building shall slope a minimum of 1/4 inches per foot away from building. *Refer to UBC section 1804.7*

FOUNDATIONS

CHAPTER 2

this chapter

COMMON CONSTRUCTION ERRORS

- Forms inadequately braced
- Reinforcement not supported
- Piers not centered properly
- Water in pier holes
- Reinforcement clearance in footings
- Setback not maintained

FOUNDATION

COMMON CONSTRUCTION ERRORS	DESCRIPTION / DISCUSSION
FOUNDATION FORMS INADEQUATELY BRACED.	Inadequate or inappropriate bracing may cause foundation or wall to "blow-out". It may cause bulges or alignment problems with mud sills. *Refer to UBC Section 1906.1*
REINFORCEMENT NOT SECURELY SUPPORTED.	*Reinforcement shall meet minimum tolerances as stated in code per UBC Section 1907.5*
PIERS NOT CENTERED PROPERLY IN RELATION TO GRADE BEAMS.	Piers offset from center of grade beams will be subject to additional loads due to the eccentricity. This may result in deflection, tilting of the pier grade beam system and will be rejected during inspection. *Refer to Standard engineering practice and UBC Section 1905.7.1*
WATER IN PIER HOLES.	In general, standing water in pier holes should not be pumped out prior to concrete placement, but rather the concrete should be placed under water by tremie. Pumping of holes will generally induce instability in the pier hole sidewalls. *Refer to Standard engineering practice and UBC Section 1905.7.1*
REINFORCEMENT CLEARANCE IN THE SIDE AND BOTTOM OF FOOTINGS NOT MEETING CODE MINIMUM.	Concrete cast against and permanently exposed to earth requires a minimum 3" concrete cover over any reinforcing steel. For concrete that is not cast against earth, but exposed to weather, a 2" concrete cover is required for #5 rebar and $1^1/_2$" of cover is required for #6 rebar or larger. *Refer UBC Section 1907.7.1*
SETBACK NOT MAINTAINED FROM PROPERTY LINES OR EASEMENTS.	Failure to maintain required setbacks may require demolition and rebuilding the wall to proper setback. Walls closer than 3 feet from the property line for single family residential construction must have one hour construction. *Refer to UBC Table 5-A and Local Planning Ordinances*

FRAMING

CHAPTER 3

this chapter

COMMON CONSTRUCTION ERRORS

- Walls not plumb
- Hold down straps
- Inadequate venting
- Joist not adequately nailed
- Stairs riser and tread
- Bottom plates
- Plywood sheets spanning bays
- Fire blocks
- Notching of sill plate
- Weep screed
- Over driven nail

FRAMING

COMMON CONSTRUCTION ERRORS	DESCRIPTION / DISCUSSION
WALLS ARE NOT PLUMB, TRUE OR ADEQUATELY BRACED.	In addition to the aesthetics, load paths may be affected if walls are not plumb and straight. *Refer to UBC Section 1605.3*
HOLD-DOWNS AND STRAPS NOT IN PLACE, PROPERLY NAILED OR TIGHTLY BOLTED.	Framing hardware shall be installed according to manufacturer's instructions to develop the strength values for which they are intended. *Refer to UBC Section 2304.4.1 & manufacturer's installation standards.*
INADEQUATE VENTING AND/OR ACCESS TO ALL UNDER FLOOR AREAS.	Cross ventilation of, and access to, crawl space areas are often impeded by grade beams, heating ducts and sewer lines. *Refer to UBC Section 2306.7 & 2306.3*
JOISTS NOT ADEQUATELY NAILED TO SILL PLATE OR TO TOP PLATE.	*Refer to sketch on Fig.4A and Fig.4B, General Frame Nailing Requirements.*
INCONSISTENT RISER HEIGHT OR TREAD WIDTH AT STAIRS.	The intent of the code is to provide uniformity in stair construction and prevent accidents. Maximum riser height for residential construction is 8" and minimum riser height is 4". Minimum tread dimension is 9", measured nosing to nosing. Variations in these dimensions are limited to 3/8" between highest and lowest risers and widest and narrowest treads. Often the contractor fails to take into account a change in material at landings such as hardwood flooring, marble and tile, which add to the riser height. Refer to UBC Section 1003.3.3.3
BOTTOM PLATES NOT ADEQUATELY NAILED.	Bottom plate nailing often required for shear transfer. *Refer to Fig. 4A, General Frame Nailing Requirements.*
3X STUDS AND PLATES NOT INSTALLED WHERE REQUIRED.	*Note – UBC table 23-II-I-1 or Shear Schedule on Plan*
MISSING LAYOUT CAUSING INADEQUATE BEARING.	*Refer to UBC Sections 2320.8.2, 2320.8.4, 2320.11.6*
PLYWOOD SHEETS SPANNING LESS THAN 2 BAYS OR RUN PARALLEL TO JOISTS.	*Refer to UBC Sections 2312 and 2315.3.3, UBC tables 23-II-E-1, 23-II-E-2 and 23-II-H.*
FIRE BLOCK MISSING ON WALLS OVER 10 FEET.	*Refer to UBC Section 708.2.1*
IMPROPER NOTCHING OF SILL PLATE	*Please refer to Fig. 1*
WOOD FRAMING CLEARANCES FROM EARTH WAS NOT MET	*Please refer to Fig. 2*
WEEP SCREED INSTALLED IMPROPERLY	*Please refer to Fig. 3*
OVER DRIVEN NAIL	*Please refer to Fig. 5*

FRAMING

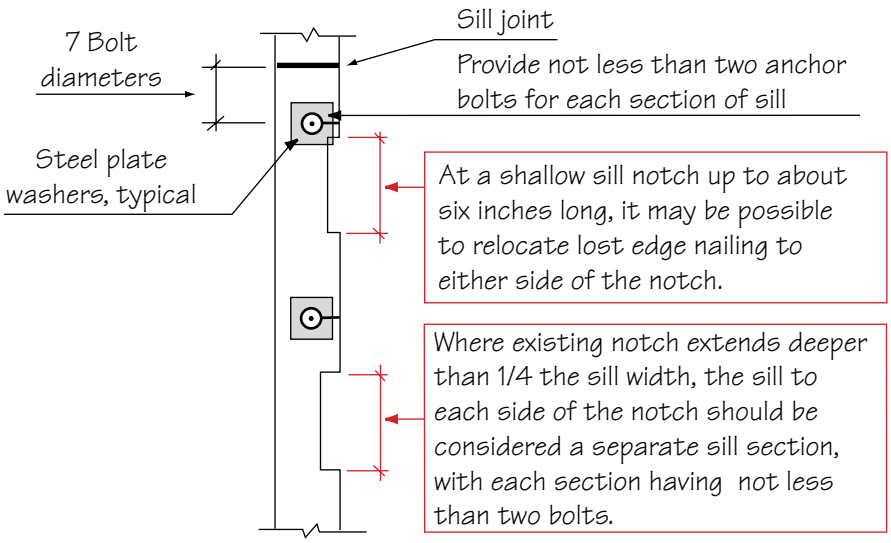


FIG. 1 ~ FOUNDATION SILL PENETRATIONS

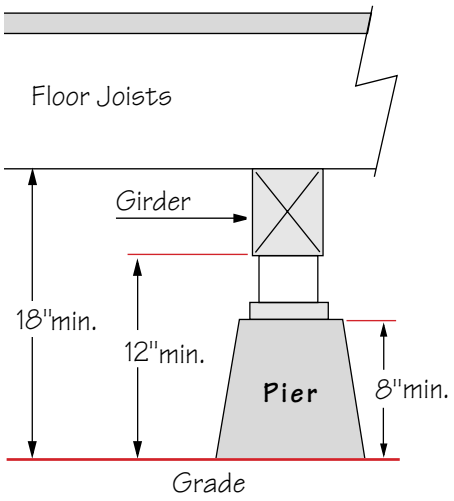


FIG. 2 ~ UNDER FLOOR CLEARANCES

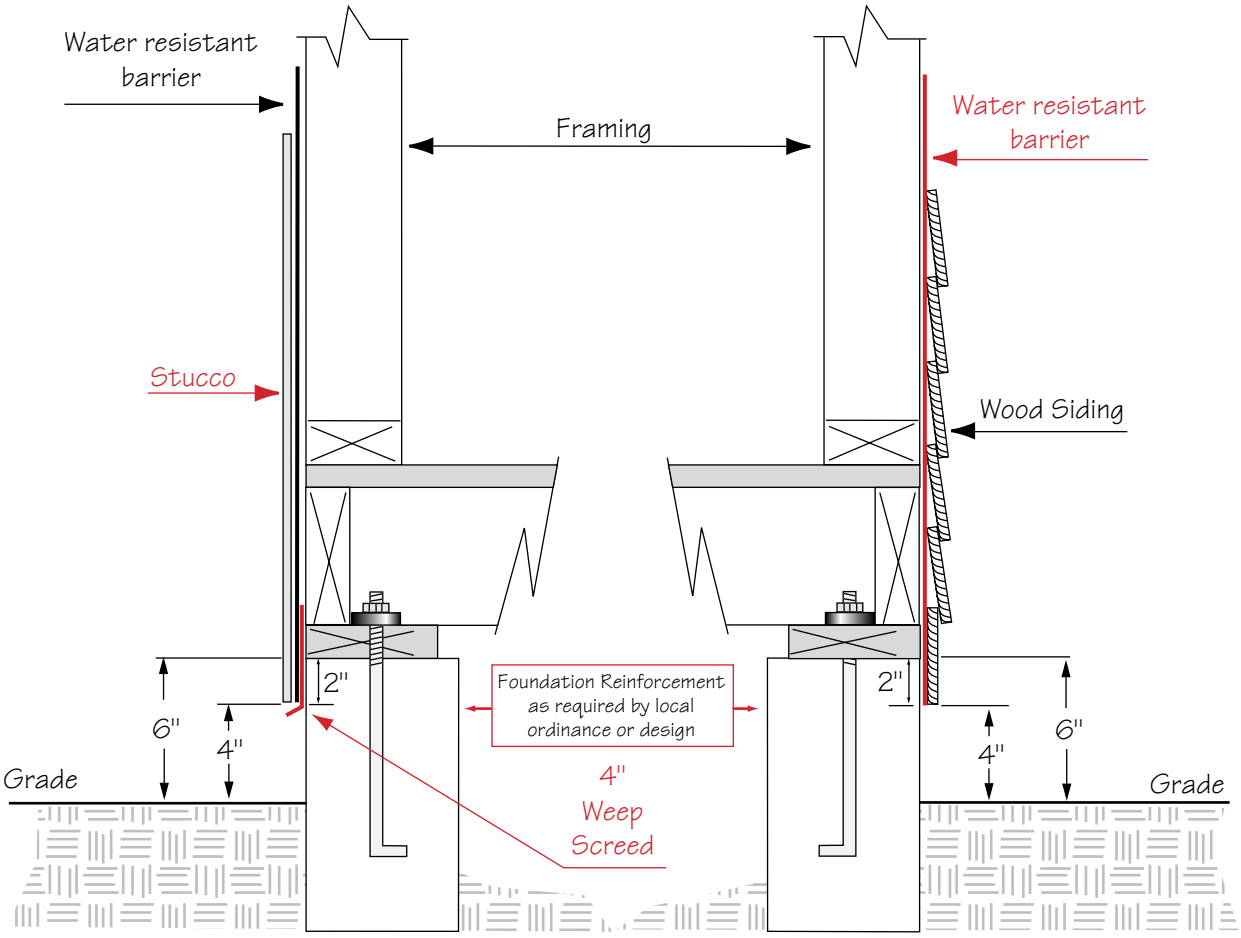


FIG. 3 ~ WEEP SCREED CLEARANCES

GENERAL FRAMING NAILING REQUIREMENTS

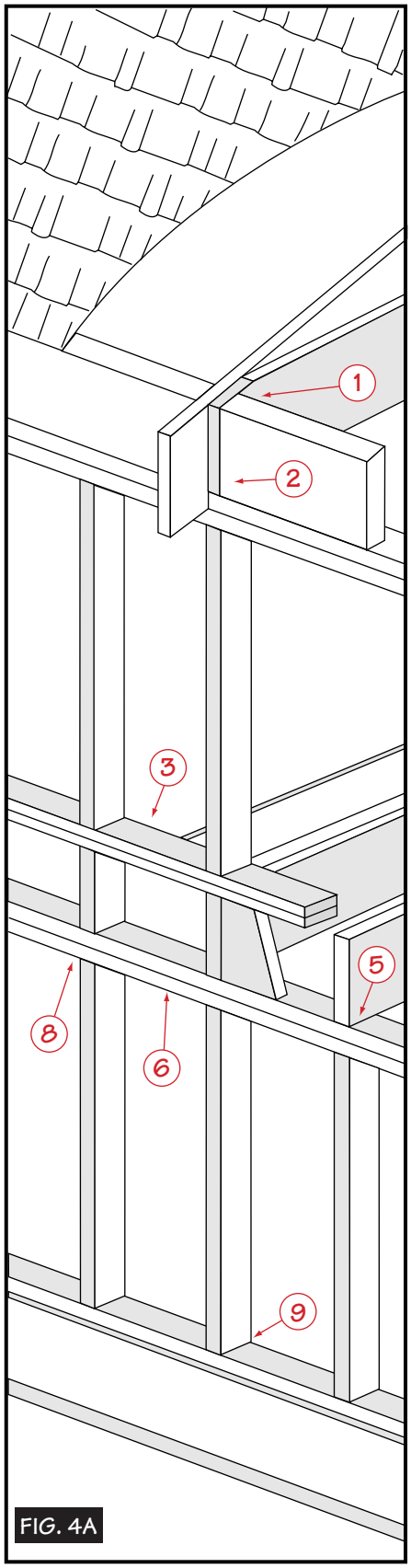
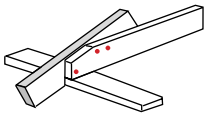
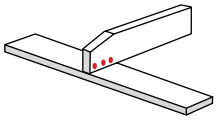


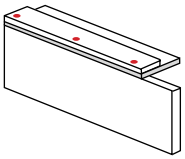
FIG. 4A

1 

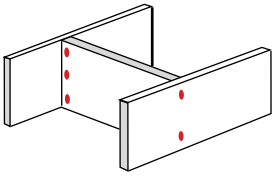
Ceiling joist to parallel rafters:
3-16d common or box nails.

2 

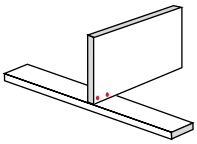
Ceiling joist to plate toenail:
3-8d common or box nails.

3 

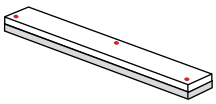
Sole (bottom) plate to joist or blocking:
16d common at 16" O.C.

4 

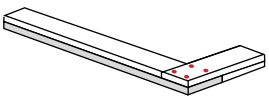
Blocking to joist:
3-8d common or box nails, toenail or
2-16d common or box nails, face nailing.

5 

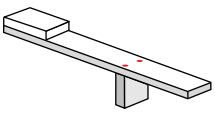
Joist to mud sill or upper top plate:
3-8d common, box nails or toenails.

6 

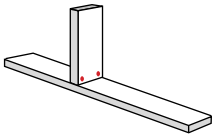
Top plates typical stitching:
16d common or box nails at 16" O.C.

7 

Top plates lap at intersection, face nail:
2-16d common or box nails. 4 is recommened.

8 

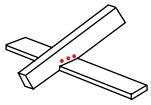
Lower top plate to stud:
2-16d common or box nails.

9 

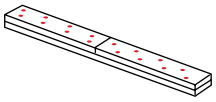
Stud to sole bottom plate:
2-16d common or box nails.

GENERAL FRAMING NAILING REQUIREMENTS

(10) **Rafter to Plate, toenail:**
3-8d common box nails.

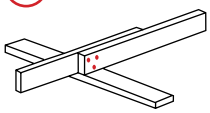


(11) **Upper top plates at laps:**
8-16d common or box nails.

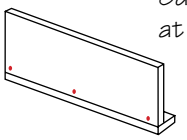


(12) **Ceiling joist, lap over walls and partition:**
3-16d

NOT SHOWN IN DIAGRAM

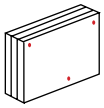


(13) **Rim joist to upper top plate or mud sill:**
8d common, box nails or 16d toenails at 6" O.C.



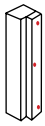
(14) **Three piece built up girder and beam:**
20d @32" O.C. @ top, bottom and staggared.
2-20d @ ends and each splice.

NOT SHOWN IN DIAGRAM



(15) **Double studs, or built-up studs typical stitching:**
16d common or box nails at 24" on center.

(16) **Built up corner studs:**
16d box nails at 24" O.C.



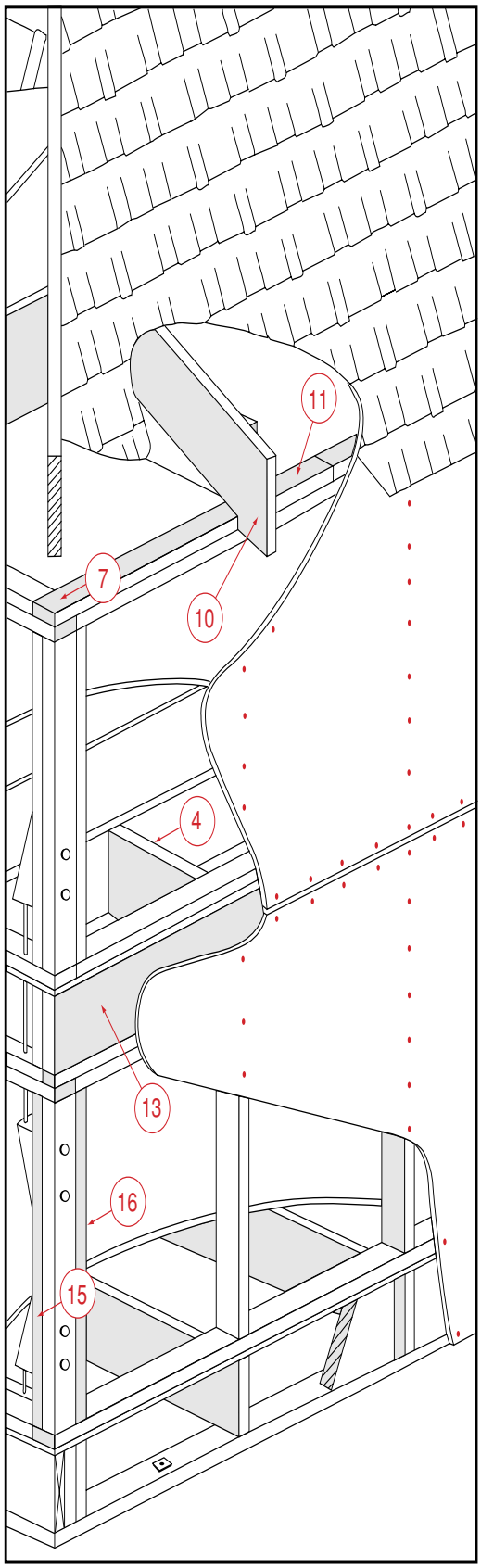


FIG. 4B

FRAMING

Nails shall be considered overdriven when the top of the head of the nail is more than 1/32" below the face of sheathing.

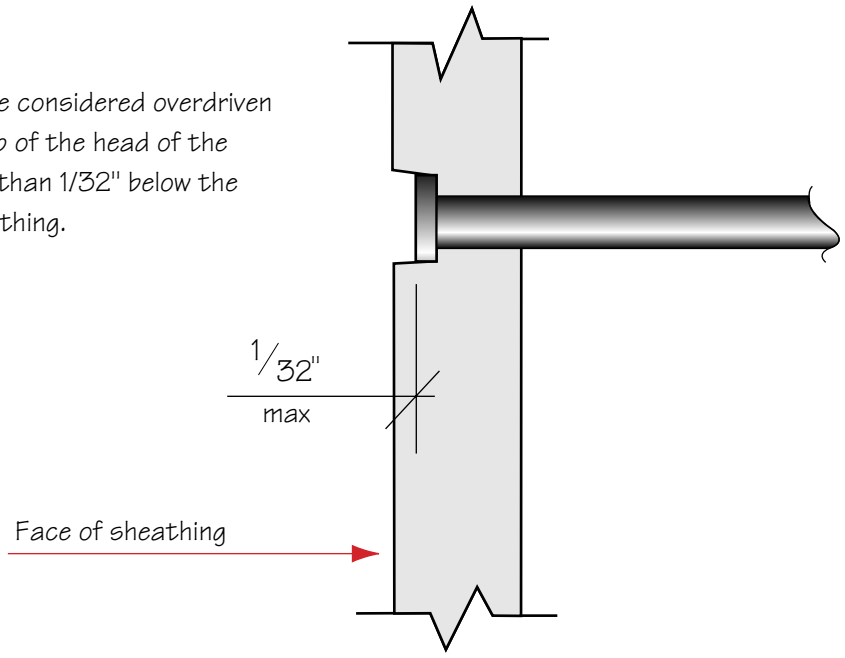
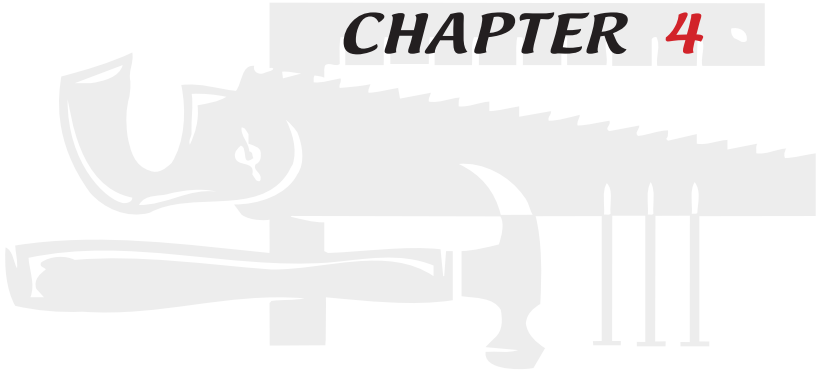


FIG. 5 ~ OVER DRIVEN NAIL

SHEAR AND FRAMING DETAILS

CHAPTER 4

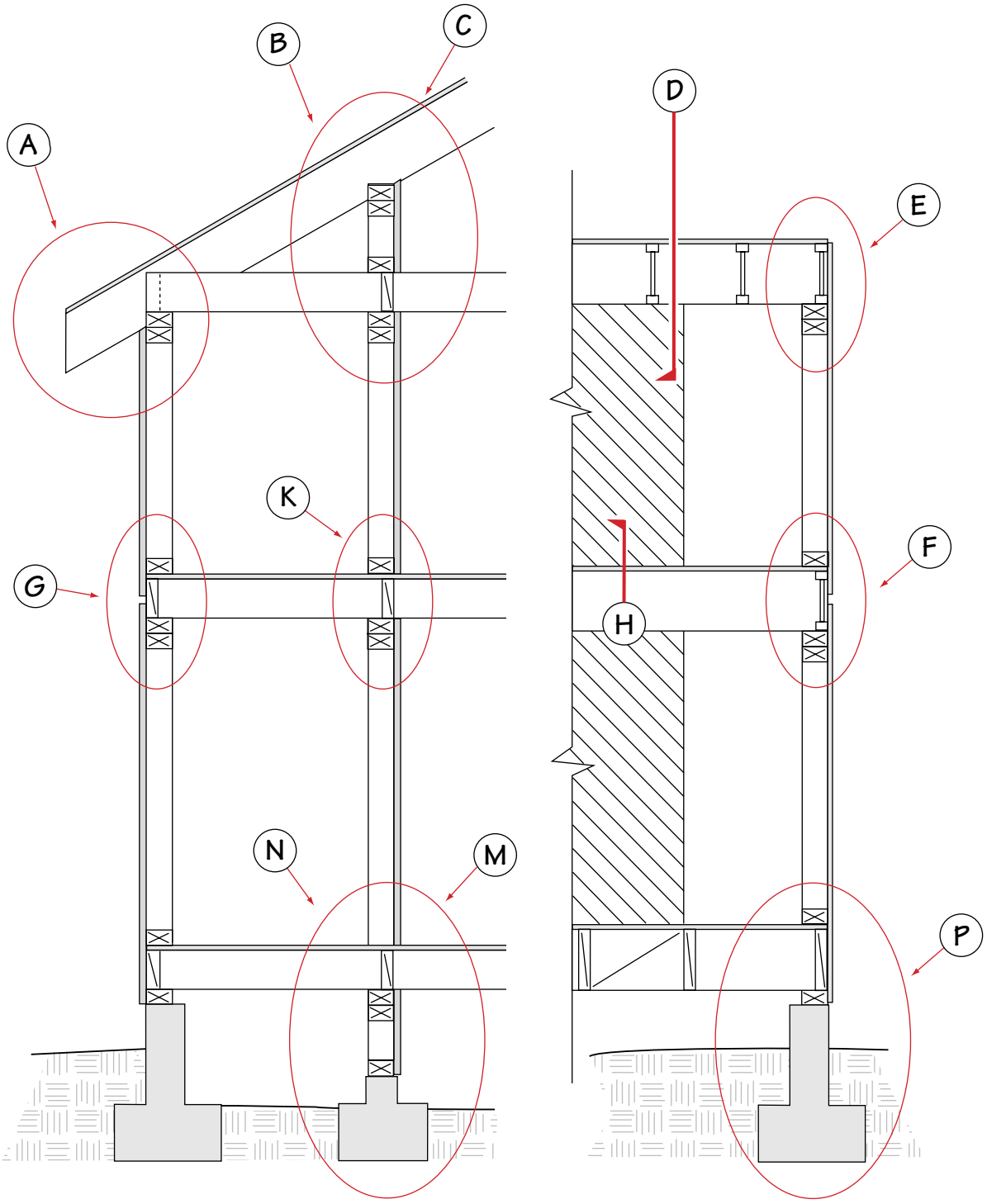


this chapter

SHEAR AND FRAMING DETAILS

- Figure 6 ~ Shear and framing elevations
- Detail A ~ Roof connection to exterior at eave
- Detail B ~ Attic shear-wall extension
- Detail C ~ Attic shear-wall between trusses
- Detail C ~ Section AA - attic shear-wall between trusses
- Detail D ~ Interior shear-wall connection to roof
- Detail E ~ Shear-wall connection at flat roof
- Detail F ~ Shear transfer at I-joist floor or rim joist
- Detail G ~ Exterior wall through-floor shear transfer with sheathing spliced on block or rim joist.
- Detail H ~ Through-floor shear-wall connection with I-joist framing at interior wall location.
- Detail K ~ Through-floor shear-wall connection with solid sawn framing.
- Detail K ~ Section B-B - elevation of through-floor shear transfer; solid-sawn framing.
- Detail M ~ Interior wall with high stem condition.
- Detail N ~ Interior wall with cripple wall.
- Detail P ~ Shear-wall connection at exterior wall.
- Figure 7 ~ Typical construction diaphragm.

SHEAR AND FRAMING DETAILS

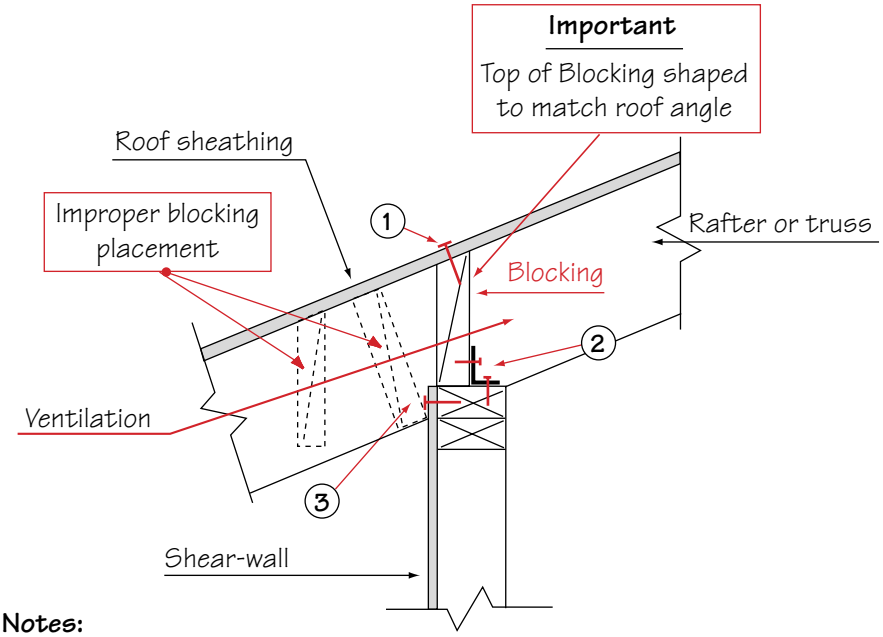


TRUSS ROOF
SOLID SAWN FLOOR
RAISED FLOOR

FLAT ROOF
WOOD I-JOIST FLOOR
RAISED FLOOR

FIG. 6 ~ SHEAR & FRAMING

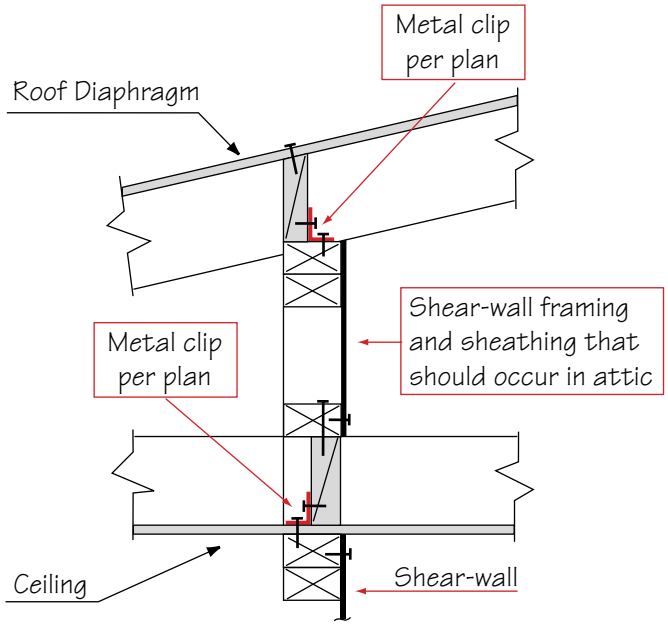
SHEAR AND FRAMING DETAILS



Notes:

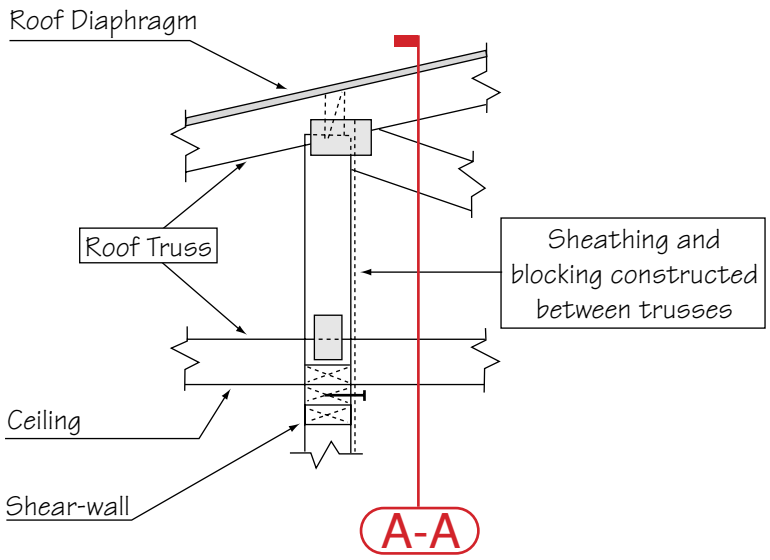
1. Roof diaphragm sheathing edge or boundary fastening to blocking
2. Blocking fastening to top plates
3. Shear-wall sheathing fastening to top plates

DETAIL A ~ ROOF CONNECTION TO EXTERIOR WALL AT EAVE

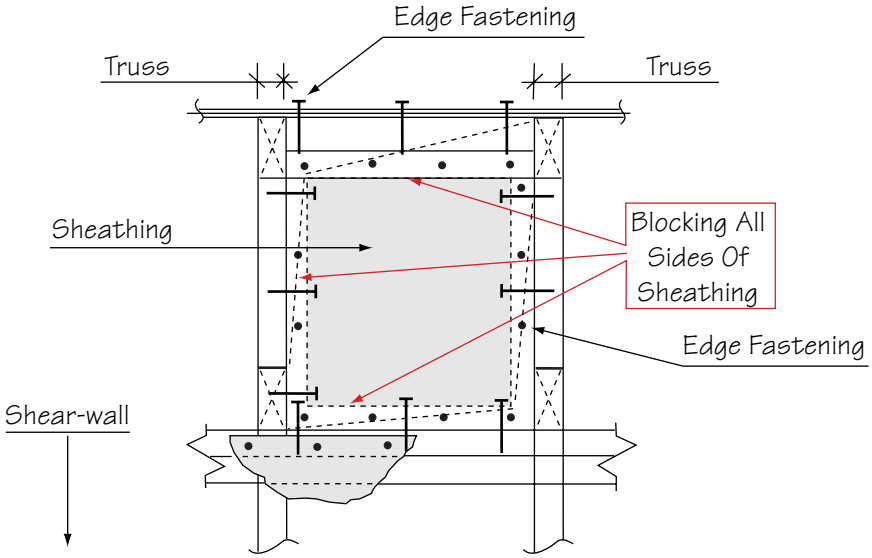


DETAIL B ~ ATTIC SHEAR-WALL EXTENSION IN CONVENTONAL ROOF FRAMING

SHEAR AND FRAMING DETAILS

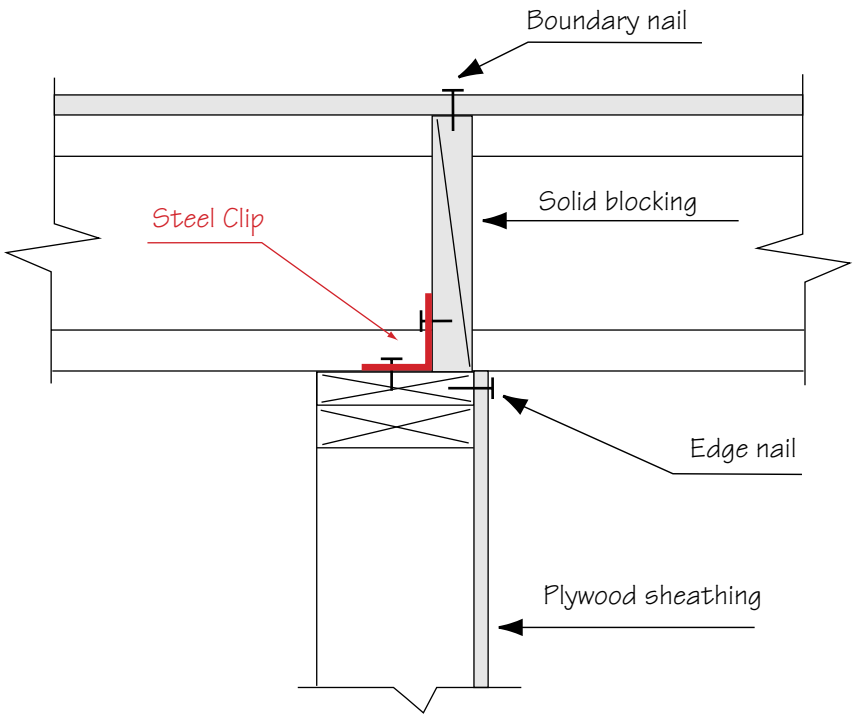


DETAIL C ~ ATTIC SHEAR-WALL BETWEEN TRUSSES

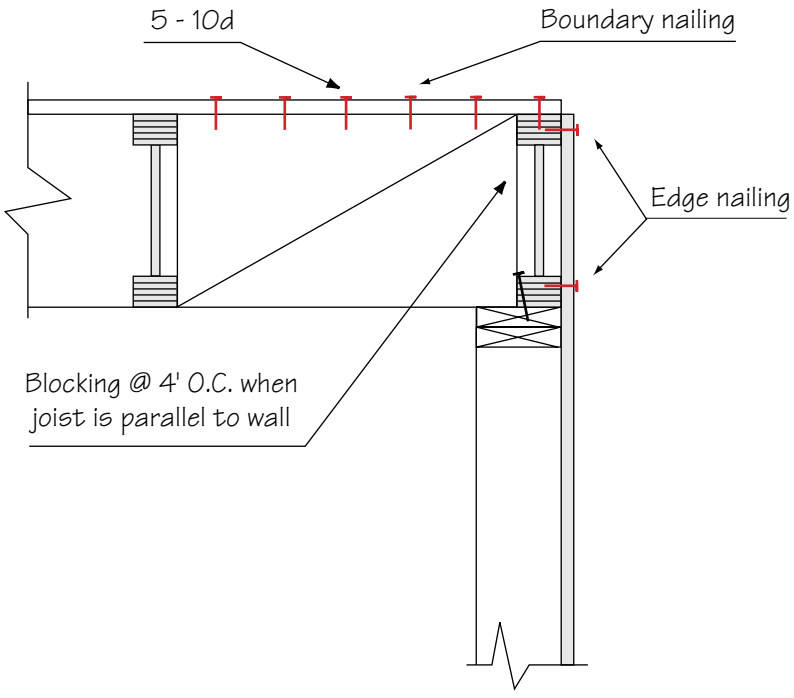


DETAIL-C -SECT. A-A ~ ATTIC SHEAR-WALL BETWEEN TRUSSES

SHEAR AND FRAMING DETAILS

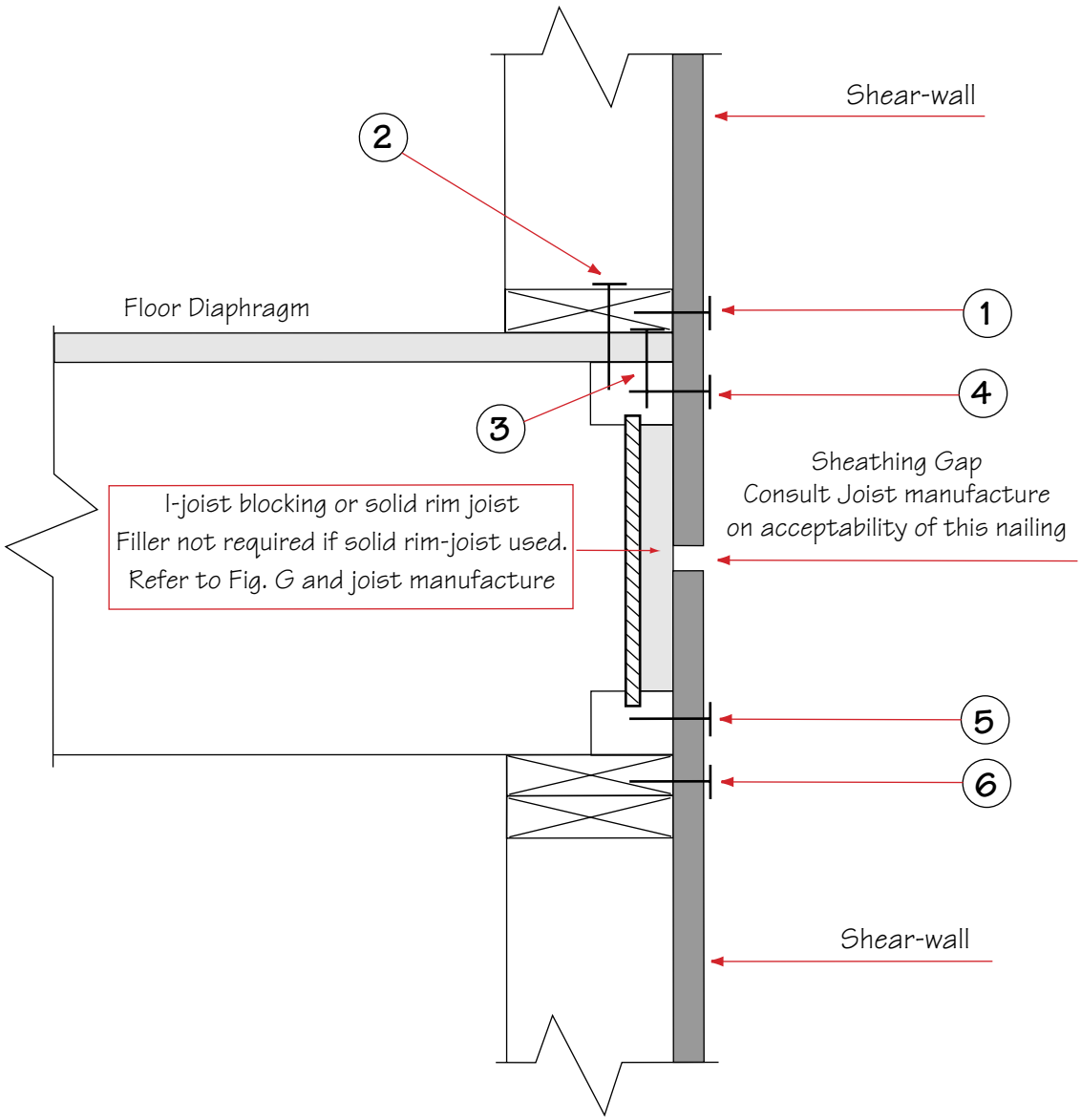


DETAIL D ~ INTERIOR SHEAR-WALL CONNECTION TO ROOF



DETAIL E ~ SHEAR-WALL CONNECTION AT FLAT ROOF

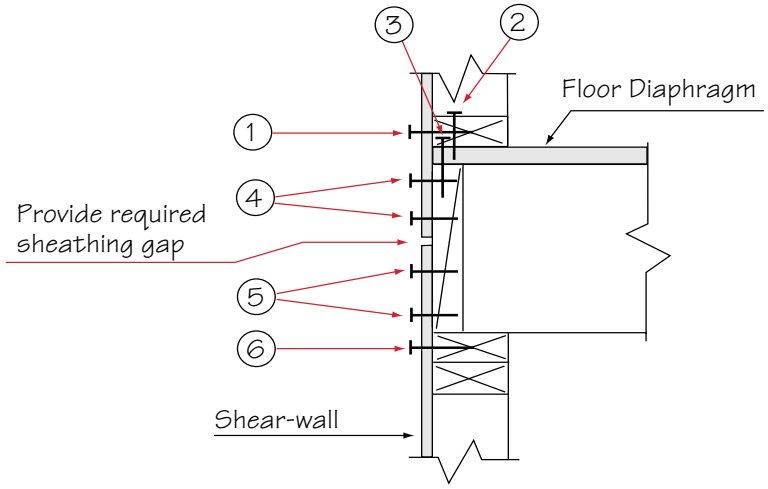
SHEAR AND FRAMING DETAILS



1. End nail from shear-wall to sole plate.
2. Sole plate nailing to top chord of I-Joist.
3. Boundry nailing floor plywood to I-Joist.
4. End nail from shear-wall to top chord.
5. End nail from lower shear-wall to bottom chord.
6. End nail from lower shear-wall to top plates.

DETAIL F ~ SHEAR TRANSFER AT I-JOIST FLOOR OR RIM JOIST

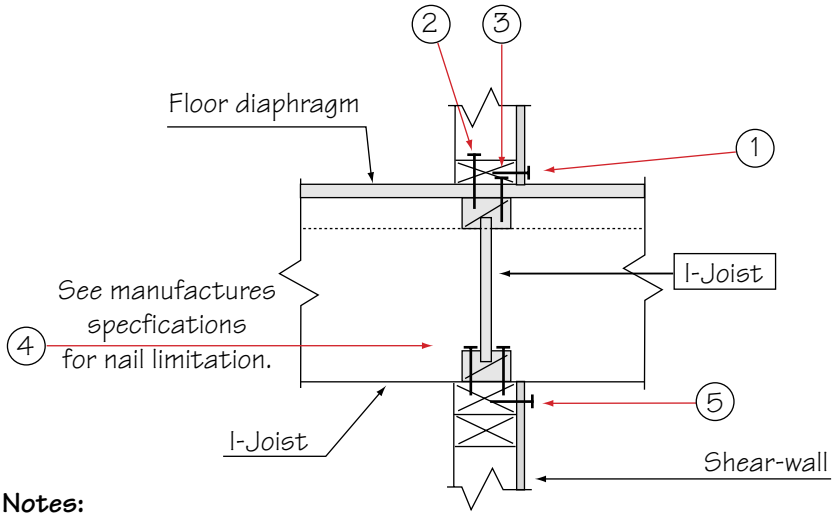
SHEAR AND FRAMING DETAILS



Notes:

1. Shear-wall sheathing edge fastening to sole (bottom) plate.
2. Sole plate fastening through floor sheathing to blocking.
3. Floor diaphragm sheathing edge / boundary fastening to blocking.
4. Upper shear-wall sheathing edge fastening to rim joist or blocking.
5. Lower shear-wall sheathing edge fastening to rim joist or blocking.
6. Shear-wall sheathing edge fastening to top plates.

FIG. G ~ EXTERIOR WALL THROUGH-FLOOR SHEAR TRANSFER WITH SHEATHING SPLICED ON BLOCK OR RIM JOIST.

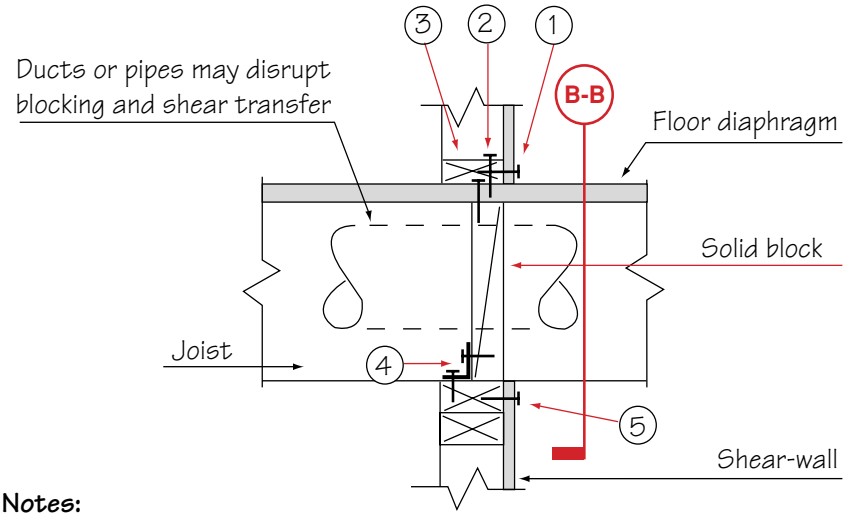


Notes:

1. Shear-wall sheathing edge fastening to sole plate
2. Sole plate fastening through floor sheathing to I-joist blocking
3. Floor diaphragm sheathing edge or boundary fastening to I-Joist blocking
4. I-joist blocking bottom chord fastening to double top plates
5. Shear-wall sheathing edge fastening to top plates

DETAIL H ~ THROUGH-FLOOR SHEAR-WALL CONNECTION WITH I-JOIST FRAMING AT INTERIOR WALL LOCATION.

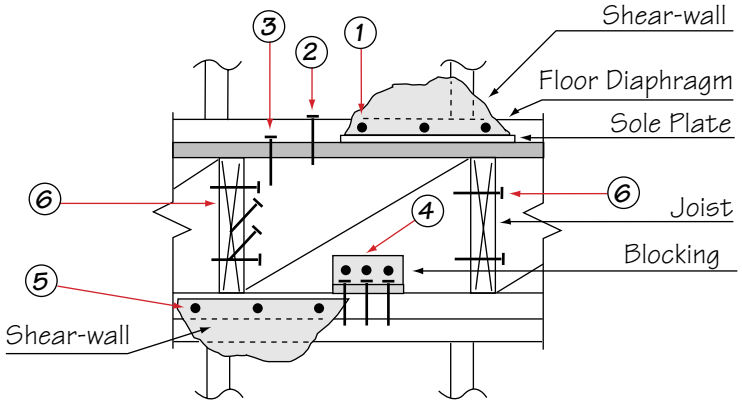
SHEAR AND FRAMING DETAILS



Notes:

1. Shear-wall sheathing edge fastening to sole plate.
2. Sole plate fastening through floor sheathing to blocking.
3. Floor diaphragm sheathing edge or boundary fastening to blocking.
4. Blocking fastening to double top plates.
5. Shear-wall sheathing edge fastening to top plates.

DETAIL K ~ THROUGH-FLOOR SHEAR-WALL CONNECTION WITH SOLID - SAWN FRAMING

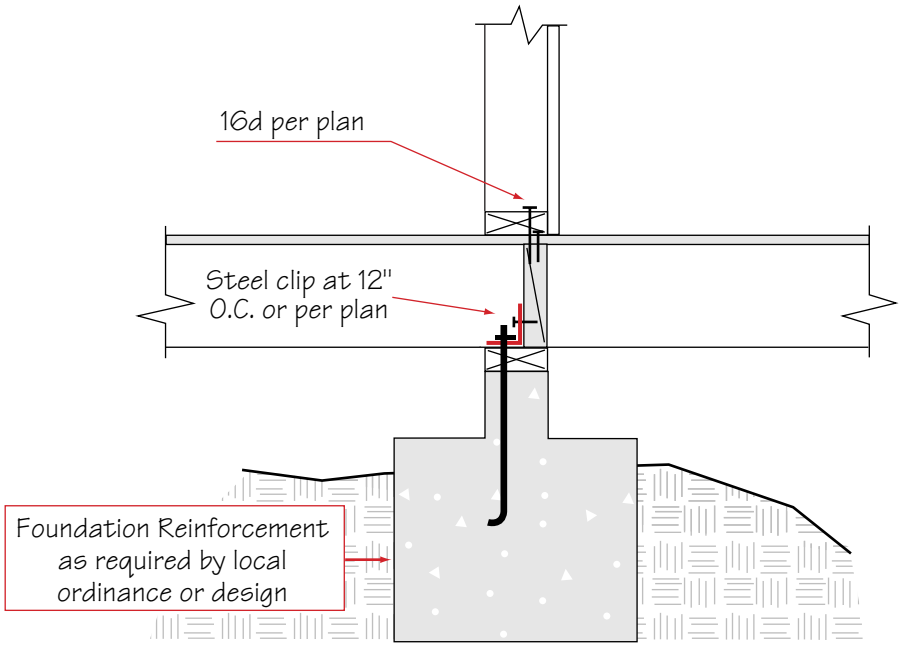


Notes:

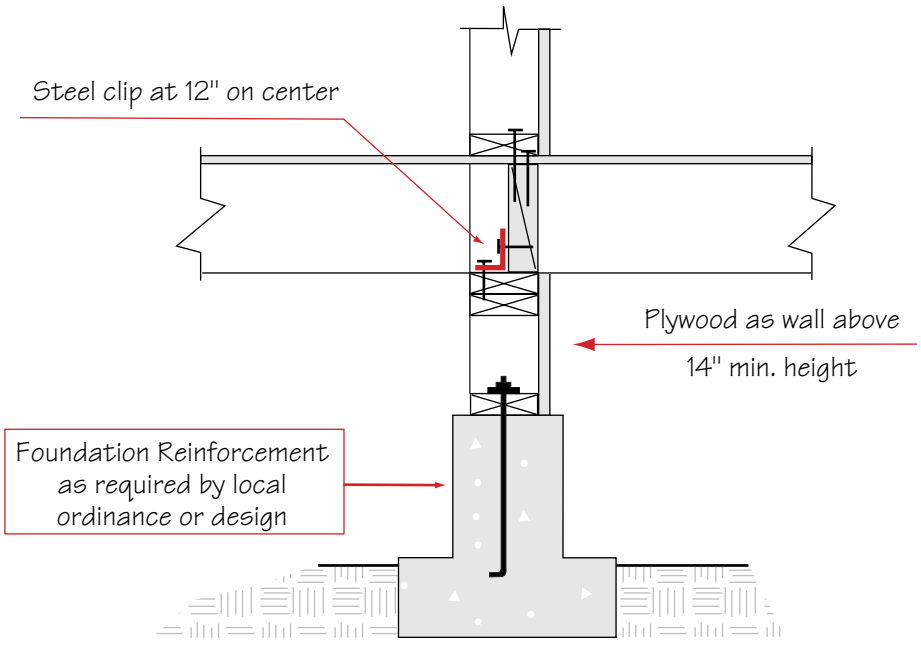
1. Shear-wall sheathing edge fastening to sole (bottom) plate.
2. Sole plate fastening through floor sheathing to blocking.
3. Floor diapharagm sheathing edge or boundary fastening to blocking.
4. Blocking angle clip fastening to top plates.
5. Shear-wall sheathing edge fastening to top plates.
6. Blocking end fastening using end nails or toenails.

DETAIL K ~ SECT. B-B ~ ELEVATION OF THROUGH-FLOOR SHEAR TRANSFER; SOLID-SAWN FRAMING

SHEAR AND FRAMING DETAILS

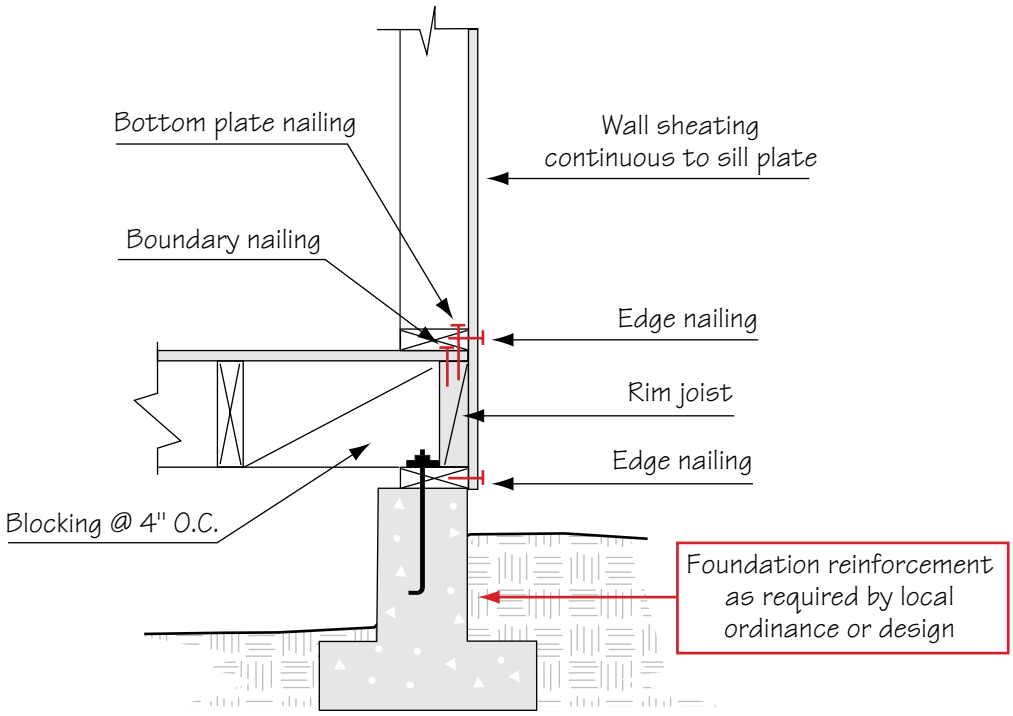


DETAIL M ~ INTERIOR WALL WITH HIGH STEM CONDITION



DETAIL N ~ INTERIOR WALL WITH CRIPPLE WALL

SHEAR AND FRAMING DETAILS



DETAIL P ~ SHEAR-WALL CONNECTION AT EXTERIOR WALL

SHEAR AND FRAMING DETAILS

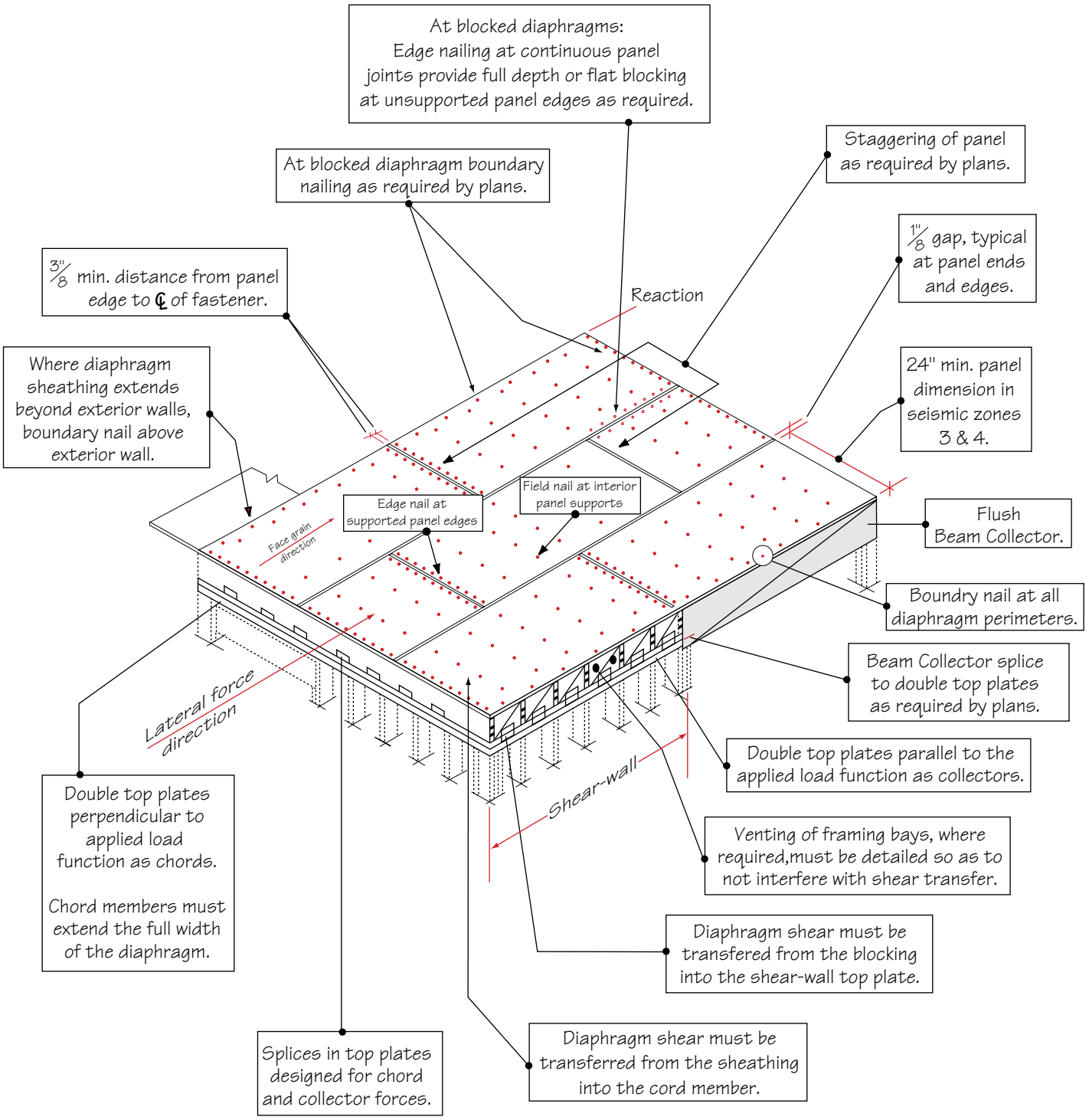


FIG. 7 ~ TYPICAL FLOOR OR ROOF DIAPHRAGM

NOTES

SHEAR WALL CHECKLIST

CHAPTER 5

this chapter

JOB AID

- Inspection checklist for wood frame shear-walls

JOB AID:

Inspection Checklist for Wood Frame Shear Walls

1. VERIFY FROM THE STRUCTURAL FRAMING PLANS AND ARCHITECTURAL FLOOR PLANS THE LOCATION AND THE LENGTH OF ALL SHEAR-WALLS

2. VERIFY THE NAILING OF SHEATHING AGREES WITH THE SHEAR-WALL SCHEDULE

- Nail type (common, galvanized box).
- Nail diameter (8d or 10d).
- Nail length (minimum penetration into framing 12 times nail diameter).
- Spacing along each edge of each piece of sheathing (6", 4", 3", etc.).
- Nail head shape (clipped heads not permitted).
- Nail placement.
    - ••• Driven flush but not overdriven
    - ••• Edge nails into hold-down post
    - ••• Minimum $^{3}/_{8}$" from sheathing edge to center of nail
    - ••• View the stud side to check for nails that missed framing
    - ••• Staggered along edges where spacing is 3 inches o.c. or less

3. VERIFY SHEATHING MATERIAL AGREES WITH THE STRUCTURAL NOTES

- Type (plywood or OSB).
- Grade (APA Rated Panel or APA Rated Panel – Structural I).
- Thickness ($^{3}/_{8}$" or $^{15}/_{32}$").
- Number of plys (If specified for plywood).

4. VERIFY LUMBER SIZE AND GRADE AGREES WITH THE STRUCTURAL NOTES

- Framing grade of studs & posts (stud, construction, No. 2, No. 1).
- Lumber species (Douglas Fir Larch, Hem-Fir).
- Framing Size (3x studs, at heavily nailed edges, 4x or 6x at HD posts).

5. VERIFY BOTTOM OF WALL SHEAR TRANSFER (SILL/SOLE PLATE) CONNECTION IS BASED ON THE STRUCTURAL NOTES OR SPECIFIC SECTIONS AND DETAILS

- Nailing size and spacing of wall sole plate to floor framing below from shear-wall schedule; verify nails penetrate framing below.
- Foundation sill bolt diameter and spacing from shear-wall schedule or notes.
- Bolts not less than 7 bolt diameters from ends of sill piece; not more than 12 inches from ends; not less than 1 inch from edge of sill plate; not less than 1 inch to edge of concrete foundation.
- Verify 2" square plate washer is used on bolts.
- Verify bolt hole in sill plate is not more than $^{1}/_{16}$" larger than bolt diameter.

EXTERIOR / INTERIOR FINISH

CHAPTER 6

this chapter

COMMON CONSTRUCTION ERRORS

EXTERIOR FINISH

- Inadequate flashing or caulking
- Inadequate lapping or tears in building paper
- Inadequate painting
- Building products/components not installed correct
- Earth to untreated wood clearance
- Exposed ABS piping
- Stucco and flat work clearances

INTERIOR FINISH

- Staircase and guardrail balusters
- improper nailing drywall
- Stair handrail not proper elevation
- Improper headroom at stairway
- improper rise and run

EXTERIOR FINISH

COMMON CONSTRUCTION ERRORS	DESCRIPTION / DISCUSSION
INADEQUATE FLASHING OR CAULKING TO PREVENT WATER INTRUSION (SEALING PENETRATIONS).	*Refer to UBC Section 1402.2*
INADEQUATE LAPPING OR TEARS IN BUILDING PAPER.	Building paper and weather resistive felt behind the exterior siding shall be free from holes and breaks (other than fasteners) and installed so that the upper layer laps over the lower layer. Horizontal laps shall be at least 2", vertical laps at least 6". *Refer to Section UBC 1402.2* *Refer to Section UBC 1402.1*
INADEQUATE PAINTING.	One coat is usually insufficient to protect wood or metal from weather. Industry standard suggest at least 1 primer coat and 1 finish coat of paint. *See Section 2306.12 of UBC 1997 for wood.*
BUILDING PRODUCTS AND COMPONENTS NOT INSTALLED ACCORDING TO MANUFACTURER'S RECOMMENDATIONS.	Proprietary products require installation specific to the manufacturer. Often installation instructions are not followed resulting in poor performance of exterior finishes- i.e. hardboard siding. *Refer to Section 104.2.8 & ICBO reports*
MAINTAINING PROPER CLEARANCE FROM EARTH TO UNTREATED WOOD.	Often siding is buried or installed too close to soil creating a situation which is conducive to decay or termite infestation. *Refer to UBC Section 2306.8* *Refer to UBC Section 1804.7*
EXPOSED ABS PIPING NOT PROTECTED FROM SUN'S ULTRA VIOLET RAYS.	Exposed ABS vent piping is required to be coated with 2 coats of Latex paint. *Refer to Section 313.3 IAPMO Installation standards*
CLEARANCES BETWEEN STUCCO AND FLAT WORK	*See illustration Fig. W, next page.*

EXTERIOR

NOTES:
FLASHING SHALL EXTEND MIN. OF 6" ABOVE FINISHED CONCRETE.
INSPECTION OF FLASHING IS REQUIRED BY THE CITY PRIOR TO PLACING CONCRETE.

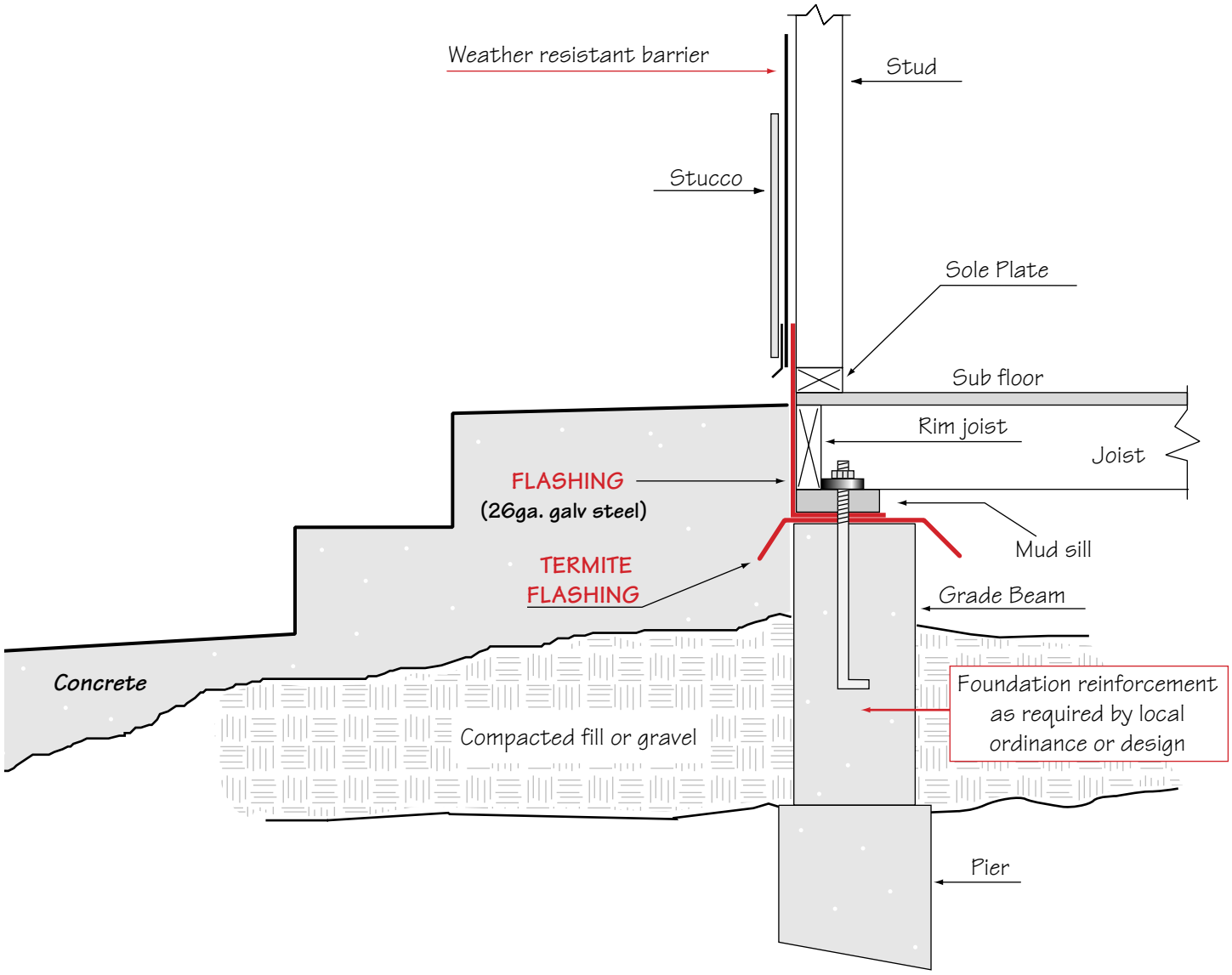


FIG. W ~ FLASHING DETAIL– CONCRETE TO WOOD

INTERIOR FINISH WORK

COMMON CONSTRUCTION ERRORS	DESCRIPTION / DISCUSSION
MORE THAN 4" BETWEEN STAIRCASE AND GUARDRAIL BALUSTERS.	Spacing is limited to ensure that small children cannot fall through. Often contractor forgets the space between guardrail and abutting wall. *Refer to UBC Sections 1003.3.3.7 & 509.3*
IMPROPER NAILING OF THE DRYWALL.	General nailing requirements ensure that drywall is held on wall securely, does not bow between supports and provides a proper finish surface. If drywall is part of fire-resistive assembly, it must be nailed in accordance with tested assemblies to ensure proper fire-resistance is provided. Shear-wall, nail spacing and nail size are important to ensure that full shear value is developed in wall. Often undersized nails are used at greater spacings than listed affecting both fire-resistance and shear resistance of party walls. *Refer to UBC Sections 2511.3, 2511.4, Table 25G, H, &I 2513.1, 703.2*
STAIR HANDRAIL NOT AT PROPER ELEVATION.	Handrails shall be placed 34" - 38" above landings and stair tread nosings. Ends shall be returned or have rounded terminations. Stairways greater than 44" wide shall have a handrail on each side. *Refer to section UBC 1003.3.6*
IMPROPER HEADROOM AT STAIRWAY.	Stairways shall have a minimum headroom of 6'8". *Refer to UBC Section 1003.3.4*
IMPROPER RISE AND RUN OF STAIRS.	Steps and stairs shall have a maximum rise of 8" and a minimum run of 9". *Refer to UBC Section 1003.3.3*
EXCESSIVE THRESHOLD HEIGHT. FLOOR NOT LEVEL AT DOORWAYS. EXCESSIVE HEIGHT FOR DOOR THRESHOLDS.	Exterior doors used for exiting a building shall have a floor or landing on either side of the door. Threshold height shall not exceed 1" above the floor, except if access is required with persons with disabilities (by chapter 11 of the UBC) threshold height cannot exceed 1/2". Landing shall be level except that exterior landings may have a slope not to exceed 1/4" per foot. Landings shall have a width not less than the width of the xxxx and a length measured in the direction of travel of not less than 36". *UBC Section 1003.3.1.6 & 1003.3.1.7*

ELECTRICAL

CHAPTER 7

this chapter

COMMON CONSTRUCTION ERRORS

- Reversed polarities
- Conductor identification
- Missing GFCI outlets
- Wiring not stapled
- Exposed NMC
- Inadequate grounding
- Supplemental ground electrode
- Electrode to main water line
- Improper size electrode
- No AFCI in bedrooms outlets
- Illegal splices and taps
- Dedicated circuits
- Common wall fire caulking
- Outlet and switch boxes
- Proper bonding to service panel
- Labeling disconnect switches and breakers
- Sizes of wires
- Working spaces
- Blocking requirements

ELECTRICAL

COMMON CONSTRUCTION ERRORS	DESCRIPTION / DISCUSSION
REVERSED POLARITIES.	No grounded conductor shall be attached to any terminal or lead, so as to reverse the polarity. *Refer to Article 200-11*
NOT PROPERLY IDENTIFYING CONDUCTORS.	Terminals must be marked for identification. Polarity refers to the path that electricity is allowed to travel through a circuit or appliance. With proper polarity, the electricity travels through the circuit on the hot conductor and returns to ground on the grounded conductor. Using this as a standard, manufacturer's design electrical tools and appliances so that electricity travels through a dedicated path. *Refer to NEC Article 200-10*
MISSING GFCI OUTLETS.	GFCI outlets shall be installed in the following locations: • dwelling units • bathrooms • garages and access buildings • outdoor outlets (readily accessible) • crawl spaces • unfinished basements • kitchens (all countertop outlets) • wet bar sinks. *Refer to NEC Article 210-8a*
WIRING NOT STAPLED.	Not properly supporting or fastening non-metallic sheathed cable (NMC wiring). Wiring must be supported every 4'-6" and within twelve inches of every box, cabinet or fitting. Fasteners can be staples, cable ties, straps or similar fittings. Cable running through holes in wood or metal studs, joists or rafters is considered supported. *Refer to NEC Article 336-18*
EXPOSED NON-METALLIC SHEATHED CABLE.	NMC wiring must be protected from physical damage where necessary. By passing through floors it must be protected with piping extending 6 inches above the floor. NMC wiring within 6' of attic access must be protected. *Refer to NEC Article 336-6b and 333-12*
INADEQUATE GROUNDING.	The electrical system and electrically conductive materials shall be effectively grounded in earth in a manner that will limit the voltage imposed by lightning or line surges and that will stabilize the voltage to earth during normal operations. *Refer to NEC Article 250-2 (a)*

ELECTRICAL continued

COMMON CONSTRUCTION ERRORS	DESCRIPTION / DISCUSSION
INADEQUATE GROUNDING ~NOT PROPERLY INSTALLING GROUNDING ELECTRODES.	The electrode shall be installed so that at least eight feet of length is in contact with the soil. It shall be driven to a depth of at least eight feet. The end of the grounding electrode shall be flush with or below ground unless the connection end is protected from physical damage. *Refer to NEC* Article *250-52 (c) (3).*
NOT INSTALLING A SUPPLEMENTAL GROUND ELECTRODE.	A supplemental ground electrode shall be installed and can be any of the following: A concrete encased electrode consisting of at least 20' of rebar ($^1/_2$" min.) or bare copper conductor not smaller than #4, located within and near the bottom of a concrete foundation • Metal water lines in direct contact with the earth for at least ten feet • The metal frame of a building where properly grounded or a concrete encased electrode that has been installed in at least two inches of concrete near the footing and is at least twenty feet long. *Refer Article 250 -50 (a) is comprised of 190 sections, detailing the prescriptive requirements of grounding. These requirements should be reviewed.*
NOT PROPERLY CONNECTING GROUNDING ELECTRODE TO MAIN WATER LINE.	Grounding electrode conductor is to be attached to metal water piping within 5 feet of entrance to building. *Refer to NEC Article 250-50 (a).*
INSTALLING AN ELECTRODE MADE OF AN UNACCEPTABLE MATERIAL OR OF AN IMPROPER SIZE.	The grounding electrode conductor (GEC) shall be copper, aluminum, or copper clad aluminum. If Aluminum is used, it cannot be installed within 18" of earth. The conductor can be solid or strand, bare or covered and shall be installed full length without a splice or joint. Also allowed: Rigid or medium metal conduit, emt, flexible metal conduit (both conduit and fittings listed for grounding), armor cable and mc cable GEC. #6 and larger may be run along the surface. *Refer to NEC Article 250-64 (a), (b), (c). States minimum sizes of grounding conductors.* *Refer to NEC Article 250-66*
BEDROOM OUTLETS NOT PROTECTED BY ARC FAULT CIRCUIT INTERRUPTORS (AFCI).	All branch circuits that supply 125 volt, single phase, 15 and 20 amp. receptacle outlets in dwelling unit bedrooms shall be protected by Arc Fault Circuit Interrupters. This requirement became effective in California November 2002.

ELECTRICAL continued

COMMON CONSTRUCTION ERRORS	DESCRIPTION / DISCUSSION
ILLEGAL SPLICES AND TAPS.	Conductors shall be spliced or joined with splicing devices identified for this use, or by brazing, welding or soldering. All splices and joints are to be covered and insulated. *Refer to NEC Article 110-14, 230-46, 300-5 (e), 300-15* Feeder taps less than 10 feet long must have: a) An ampacity not less than the combined computed loads on the circuits supplied by the tap or less than the rating of the over current device attached to the tap. b) Must not extend beyond the panel box they supply. c) Conductors must be in raceway. *Refer to NEC Article 240-21(b)*
NOT PROVIDING DEDICATED CIRCUITS FOR KITCHENS, BATHS AND HEATING EQUIPMENT	Not providing a separate branch circuit for bathrooms and the proper number of kitchen circuits. Bathrooms: At least one 20 amp branch circuit shall be provided to supply the bathroom receptacle outlet(s). These circuits shall have no other outlets. *Refer to NEC Article 210-52 (d)* *Exception*: When the 20 amp circuit supplies a single bathroom, outlets for other equipment within the same room can be on this circuit. Kitchen: Two or more 20 amp small appliance branch circuits shall be provided for all outlets specified by 210-52(b) (kitchen, breakfast area, pantry and dining room). The outlet for a refrigerator may be supplied from an individual branch circuit rated at 15 amp or greater. The two appliance circuits shall serve no other outlets. Kitchen counter outlets shall be supplied by small appliance branch circuits. *Refer to NEC Article 210-52 (b)-1-2-3, (c)-5* 422-12 - CENTRAL HEATING shall be supplied by an individual branch circuit. *Refer to NEC Article 422-12*

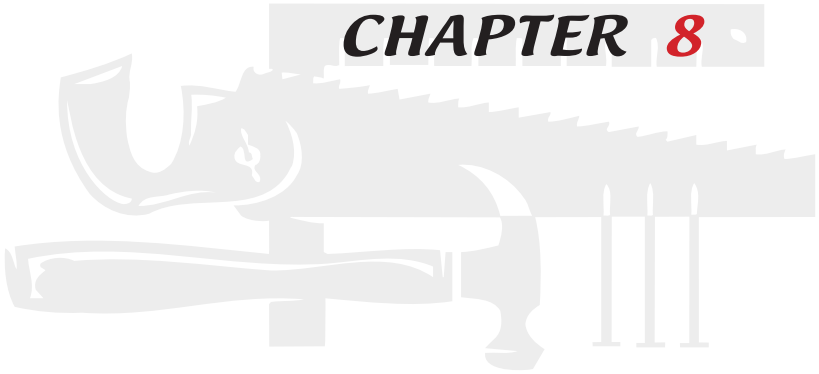
ELECTRICAL continued

COMMON CONSTRUCTION ERRORS	DESCRIPTION / DISCUSSION
WALL BETWEEN HOUSE AND GARAGE FIRE CAULKING AT J-BOXES UL STANDARD.	The maximum gap allowed between J-box and the wall sheathing is $^{1}/_{8}$ inch. If this limit is exceeded, approved fire stop caulking or pads must be applied according to the manufacturer's installation requirement. *Refer to UBC Section 709.7, and NEC Article 370-20*
OUTLET AND SWITCH BOXES NOT SET AT THE CORRECT DEPTH.	Boxes set in walls or ceilings of concrete, tile or other noncombustible material shall be installed so that the front edge of the box is not set back from the finished surface more than 1/4 inch. Boxes set in walls or ceilings of combustible material must be set flush with the finished wall surface. *Refer to NEC Article 370-20* *See UBC 709.7 for rated walls and ceilings.*
PROPER BONDING TO SERVICE PANEL OF WATER AND GAS LINES.	The interior metal water piping system and gas lines shall be bonded to the electrical service equipment, grounding electrode conductor or other approved grounding system. *Refer to NEC* Article *250-104 (a) and (b)*
LABELING DISCONNECT SWITCHES AND CIRCUIT BREAKERS AT PANEL BOARD.	Labels shall identify circuit breakers and indicate their purpose unless located and arranged so that the purpose is evident. *Refer to NEC Section 110-22*
SIZE OF OVER-CURRENT DEVICES/SIZE OF WIRE.	Circuit protection and wire size must be per code sections and listing of equipment. *Refer to NEC Article 240-3 and Table 310-16 and NEC Article 110-14 (c)*
INADEQUATE WORKING SPACES.	Not providing proper working clearances to electrical panel boxes and disconnect switches. A minimum clearance of 3 feet is required in front of electrical equipment. The space must also be a minimum of 30 inches wide. The working space must extend from the ground or floor to a height of 6'-7" feet and shall not be less than the height of the equipment. *Refer to NEC Article 110-26 (a) and (e), 380-8*
BLOCKING REQUIREMENTS FOR CURRENT CEILING BOXES AND/OR FUTURE CEILING FANS.	Most ceiling fan installations require blocking be installed. Installation of ceiling fans requires electrical permits and specially approved electrical boxes. *Refer to NEC Article 370-27 (c) and 422-18 (a) (b)*

NOTES

ELECTRICAL CHECKLIST

CHAPTER 8



this chapter

GENERAL REQUIREMENTS

- Receptacles (required)
- Non-Matallic Sheathed Cable
- Boxes and sub-panels
- Circuit breakers
- Lights (required)
- General wiring

SPECIFIC REQUIREMENTS

- Bathrooms
- Kitchens
- Laundry room
- Air conditioning and gas furnace
- Grounding system
- Main service / service change

CHECKLIST FOR RESIDENTIAL ELECTRICAL INSPECTION

(BASED ON THE NEC 99)

ITEM **SOURCE**

1. Check job address.
2. Check description of electrical work on electrical worksheet.
3. Look at city approved plans and check electrical permit for correct cost.

GENERAL REQUIREMENTS

A. RECEPTACLES (REQUIRED)

1. Receptacles are required to be located so that no point along the floor line of the room is more than 6' away from an outlet ..... [210-52(a)]
2. Any wall over 2' wide requires a receptacle ..... [210-52(a)]
3. G.F.C.I. receptacle in Garage ..... [210-52(g)]
4. G.F.C.I. receptacle outside, 1 at rear and 1 at front. ..... [210-52(e)]
5. Hallway over 10 ft long ..... [210-52(h)]

B. NM CABLE (NON-METALLIC SHEATHED CABLE)

1. Staple wire within 12" of box and every 4'-6" (use clamp to attach wire to box) ..... [336-18]
2. Staple wire within 8" of box for single gang plastic boxes (no clamp needed) ..... [370-17(c) ex]
3. Nail plates required when NMC is less than $1^{1}/_{4}$" from face of stud ..... [300-4(a) (1) (2)]
4. NMC sheathing to penetrate into box $^{1}/_{4}$" min. ..... [370-17(c)]
5. Bend of wire must be gradual (5 times diameter of wire) ..... [336-16]
6. Protect NMC wire from physical damage; (Less than 8' above floor) ..... [300-5(d)] - [336-6(b)]
7. Protect NMC within 6' of attic access ..... [333-12(a)]

C. BOXES & SUB-PANELS (SEE 370-19)

1. Outlet boxes shall be flush with combustible surfaces ..... [370-20]
2. Outlet boxes may set back into a noncombustible wall no more than $^{1}/_{4}$" ..... [370-20]
3. Provide min. 6" of free conductor in box ..... [300-14]
4. Metal boxes must be grounded ..... [250-148(a)] - [370-4]
5. All splicing must be done in boxes ..... [300-15(a)]
6. Wire overfill in boxes ..... [Table 370-16(b)]
7. Boxes must remain accessible ..... [370-29] - [370-72]
8. Sub-panels must be secured with screws ..... (manufacturer)
9. Sub-panel working clearance minimum 30" wide 36" deep above and below ..... Table [110-26(a)]
10. Sub-panel grounding wires must be isolated from the neutral buss ..... [384-20]
11. 1 hour walls; elec. boxes back to back must be offset min 24" or approved fire pad ..... [UBC 1997]
12. No sub-panels (circuit breakers) in clothes closets or bathrooms ..... [240-24 de]
13. Max. height of circuit breaker and disconnects is 6'7" ..... [380-8(a)]

CHECKLIST FOR RESIDENTIAL ELECTRICAL INSPECTION continued

ITEM **SOURCE**

D. CIRCUIT BREAKERS

1. Match circuit breaker type with electrical panel box as per manufacturer ..... [per manufacturer]
2. Match circuit breaker size to wire size (ampacity) ..... [Section 240-3] - [Table 310-16]

E. LIGHTS (REQUIRED)

1. Wall switched rooms, baths, halls, stairs (3 way if over 6 steps), garages, outdoor entrances, storage or utility area, attics and basements with equipment ..... [210-70(a) (1) (2) (3)]
2. Light outside at every exterior door, one wall switched controlled lighting outlet installed in every habitable room, hallway, stairway, attached garage and detached garage. (exception: switched receptacles) ..... [422-18(a) (b)] - [210-70(a)]
3. Paddle fans/light fixtures not to be supported by standard electrical boxes ..... [370-27(c)]
4. Recessed light (non-I.C.)-(insulation contact) 3" from insulation ..... [410-66(b)]
5. Recessed light (non-I.C.) $^{1}/_{2}$" from combustibles ..... [410-66(a)]
6. Recessed light (I.C., T.P.) (thermally protected) direct contact to Insulation ..... [manufacturer, 410-66(a) (b)]
7. See energy efficient lights in bathrooms & kitchen sections.
8. Illuminated address: check transformer wire and correct location of address on house ..... [local]
9. All lighting fixtures are to be listed ..... [110.3]

F. GENERAL WIRING

1. All splicing must be done with approved connectors ..... [110-14]
2. Don't splice #14 wire to #12 wire on 20 amp circuit breaker ..... [Table 210-24
3. General wire ampacities ..... [Table 310-16]
4. Summary of branch-circuit requirements ..... [Table 210-24]
5. Underground minimum cover ..... [Table 300-5]
6. Arc Fault Circuit Interrupter Protection, dwelling units, receptacle outlets in all bedrooms ..... [210-12(b) (6)]

SPECIFIC REQUIREMENTS

A. BATHROOMS

1. G.F.C.I. receptacle adjacent to and within 36" of each basin ..... [210-52(d)]
2. Provide 20 amp separate circuit for bathroom receptacles that is not wired to lights. ..... [210-1(c) (3)
3. Provide G.F.I. protected separate circuit for hydromassage bathtub. Provide 12" x 12" access for spa motor & motor disconnect (may be cord & plug) ..... [1680-70, 71] - [680-12]
4. Cord connected fixtures, lighting track and ceiling fans shall not be located within 3ft of horizontal edge of tub and 8ft vertical above top of tub ..... [410-4(d)]
5. Light in bathroom must be energy-efficient as per CA energy code (first switch).

B. KITCHENS

1. Provide a minimum of two 20 amp small appliance circuits for countertops, (shall be shared with dining room, pantry, and breakfast area, but no lights on S.A.C). ..... [220-4(b)] - [210-52(b) (1)]
2. All countertop receptacles must be G.F.C.I. protected. ..... [210-8(a) (6)]

CHECKLIST FOR RESIDENTIAL ELECTRICAL INSPECTION continued

ITEM **SOURCE**

B. KITCHENS (CONTINUED)

3. Countertop wall receptacles spaced so that no point along the wall and counter space line is more than 24" from a receptacle ..... [210-52(c)]
4. Countertops 12" or under must have a receptacle and one receptacle at every island and peninsula countertop ..... [210-52(c) (2) (3)]
5. Receptacle for gas-fired ranges may be attached to S.A.C. ..... [210-52(b) (1) ex.2]
6. Provide separate circuits for garbage disposal, dishwasher, built-in microwave and trash compactor, sub-zero refrigerators ..... [Local 430]
7. Garbage disposal and dishwasher receptacles must be accessible (not behind appliance) ..... [422-16(b) (1) (2)]
8. Garbage disposal plug connected with listed flexible cord. Cord to be 18"- 36" long ..... [422-16(b) (1)]
9. Dishwasher plug connected listed with flexible cord. Cord to be 36" to 48" long ..... [422-16(b) (2)]
10. Light in kitchen must be energy-efficient (not incandescent) as per California energy code and be the first switch at the wall.
11. Electrical ranges must have min. 40 amp ..... [210-23(c)]

C. LAUNDRY ROOM

1. Separate 20 amp branch circuit required for laundry room receptacle outlet(s). ..... [220-16(b)]
2. Electric dryer min. feed 30 amp (10 CU size) with 4, #10 wires ..... [220-18]

D. AIR CONDITIONING UNITS / GAS FURNACE

1. Check equipment nameplate rating to determine circuit breaker size ..... [422-10(a)]
2. Provide separate branch circuit for A.C. units and furnaces ..... [422-7]
3. Install 4 wire branch circuit for A.C. units or size to manufactures requirement ..... [250-60]
4. Provide light and receptacle for attic and under floor furnace ..... [NEC 210-63] - [210-70(c)] - [CMC 306.4]
5. Provide disconnecting means within sight of equipment ..... [440-14] - [CMC 306.2]

E. GROUNDING SYSTEM

1. *Grounding Electrode*
   a. UFER grounding electrode; 20' min #4 rebar or #4 AWG copper continuous conductor min. 2" from bottom of footing ..... [250-50(c)]
   b. 8' or 10' x $^{1}/_{2}$" ground rod completely driven ..... [250-5-52(c)]
   c. Other types of electrodes ..... [250-52]

2. *Grounding Electrode Conductor*
   a. Grounding Electrode Conductor size ..... [Table 250-66]
   b. Protect conductors from physical damage ..... [250-64(c)]
   c. Provide access to ground clamps ..... [250-68(a)]

CHECKLIST FOR RESIDENTIAL ELECTRICAL INSPECTION continued

ITEM	SOURCE

3. *Bonding conductor*
   a. Bond to all water/gas metal parts ..... [250-104]

F. MAIN SERVICE / SERVICE CHANGE

1. *Service Riser (Mast)*
   a. Secure within 36" from Service box ..... [346-12]
   b. $1^{1}/_{4}$inch + rigid steel minimum size ..... P.G.E
   c. Unsupported coupling above roof ..... P.G.E
   d. 18" minimum clearance to point of attachment ..... P.G.E
   e. Support Mast beyond 24" above roof ..... P.G.E

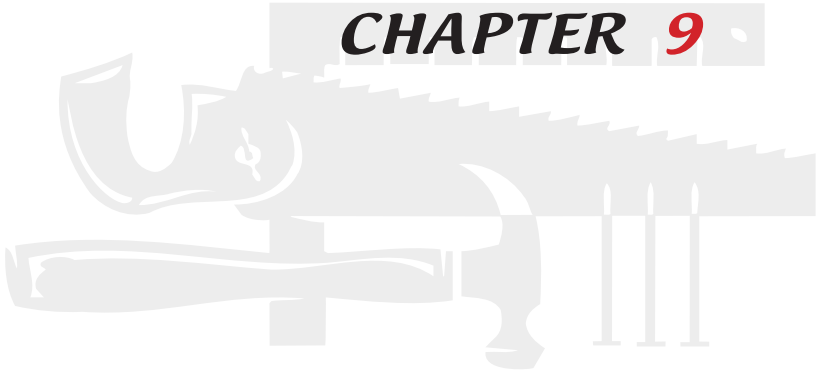
2. *Service Conductors*
   a. Conductor size ..... NEC Table [310-15(b) (6)]
   b. Identify neutral conductors at each end ..... [200-6(b)]
   c. Clearances from roof 8' less than 4" 12 pitch ..... [230-24(a), except 2, & 225-19(a)]
   d. Clearance from roof 3' more than 4" 12 pitch ..... [230-24(a), except 3, & 225 except 2]
   e. Clearance from Window 3' ..... [230-24(b) & 230-9]
   f. Clearance over driveway 12'sidewalk 10' ..... [230-24(b)]
   g. Clearance over sidewalk 10' ..... [225-18]
   h. Overhead conductors to be sunlight resistant ..... [310-8(d)]

3. *Meter/Main*
   a. Min. 100 amp for S.F.D. ..... [230-79(c)]
   b. Wire size min. #8 copper or #6 aluminum ..... [230-23(b) & 230-31(b)]
   c. Service disconnect 6 handles max. ..... [230-71]
   d. Max. height of breaker 6'7" ..... [P.G.E.-380-8(a)]
   e. Meter height 44"-66" ..... [P.G.E.]
   f. Clearance in front of main 30" wide, 36" deep ..... [110-26(a) & P.G.E.]

NOTES

MECHANICAL

CHAPTER 9



this chapter

COMMON CONSTRUCTION ERRORS

- Blocking ducts
- Lack of combustion air (furnace, water heater)
- Lack of fire-stops / clearance at flues
- Furnace or air conditioning not secure
- Equipment installation instructions not followed
- Not properly fastened flues, vents
- Improper termination of vents, flues at roof
- Ducts not supported properly
- Vent / P-trap in condensate line
- Working space for attic furnace

MECHANICAL

COMMON CONSTRUCTION ERRORS	DESCRIPTION / DISCUSSION
DUCTS BLOCKING ACCESS TO UNDER FLOOR OR ATTIC AREAS.	Accessible under-floor areas shall be provided with a minimum 18"x24" opening, unobstructed by pipes, ducts and other construction. *Refer to Section UBC 2306.3 and UMC Section 908-909*
LACK OF COMBUSTION AIR FOR FUEL BURNING EQUIPMENT, WATER HEATER, FURNACE, ETC.	Fuel burning equipment shall be assured sufficient supply of combustion air. *Refer to Section UMC 701*
LACK OF FIRE-STOPS / CLEARANCE AT FLUES.	Factory built chimneys, type L vents, type B vents (gas) or type BW vents (gas) shall be installed in accordance with the manufacturer's installation instructions and the terms of listing and applicable requirements of the code. Single wall flues require 6" clearance to combustibles and may not penetrate the ceiling. Type B requires 1" clearance. *Refer to Section UMC 803*
FURNACE AND / OR AIR CONDITIONING NOT SECURED TO THEIR SUPPORT	Stationary equipment shall be fixed in position by substantial means which prevents its incidental displacement both vertically and horizontally. *Refer to Section UMC 304.4*
EQUIPMENT INSTALLATION INSTRUCTIONS NOT FOLLOWED.	Equipment shall be installed according to its listing and the manufacturer's installation instructions shall be the minimum requirements for installation. *Refer to Section UMC 304.1*
FLUES, VENTS, VENT CONNECTORS ARE NOT PROPERLY FASTENED.	Vent sections shall be securely supported and joints sealed. A minimum of 3 fastening screws per joint are required, or joint must be interlocking. *Refer to Sections UMC 803.1, UMC 815.1*
IMPROPER TERMINATION OF VENTS, FLUES AT ROOF.	Vents too close to roofs or other portions of building. Improper terminal or cap. Type B or BW gas vents must be located at least 8' from a vertical wall or similar obstruction. Gas vents with listed caps larger than 12" shall terminate at least 2 feet above the highest point where they pass through the roof and at least 2' higher than any portion of the building within 10'. Vents with caps smaller than 12" shall be prrnitedto terminal in accordance to (UMC Table 8-1). Venting systems shall terminate not less than 4' below or 4' horizontally from, and not less than 1' above a door, an openable window or a gravity inlet to a building. *Refer to UMC Section 806 and 807*

MECHANICAL

COMMON CONSTRUCTION ERRORS	DESCRIPTION / DISCUSSION
FACTORY-MADE AIR DUCTS CRIMPED, NOT SUPPORTED PROPERLY.	Flexible ducting bent improperly, pinched or squeezed together with inadequate framed openings or spacing between supports too far apart. Supporting strap shall be 1-1/2" wide and shall be supported at 4' on center. *Refer to Sections UMC 604.4 - UMC standard 6-5*
VENT / P-TRAP IN CONDENSATE LINE.	Refer to manufacturer installation instructions. *Refer to Section UMC 310.0 and UPC 803.0 for indirect waste piping.*
WORKING SPACE FOR ATTIC FURNACE.	Access opening, passageway, or service area too small or obstructed with building components or mechanical equipment. Access openings and passage ways shall be large enough to remove the largest piece of equipment, but not less than 30" x 30". Furnace shall be provided with a unobstructed passageway at least 24" wide, and located not more than 20' from the access opening. Working platform shall be a level surface located at the front or service side of the equipment and shall be at least 30" x 30" in size. *Refer to Section UMC 305, 908.0* *Exception 1: Access opening may be 22" x 30" provided the longest piece of equipment can be removed.* *Exception 2: Working platform need not be provided when furnace can be service from access opening.*

NOTES

MECHANICAL CHECKLIST

CHAPTER 10

this chapter

ROUGH INSPECTION ~

- HVAC systems
- Under floor installation of FAU
- Equipment in Rooms
- Garage installation of FAU
- Closet installation of FAU
- Factory-built fireplaces
- Ventilation at Bathrooms, kitchen laundry rooms
- Domestic clothes dryer

FINAL INSPECTION ~

- Heating and cooling equipment
- Thermostat requirements
- Vents and Ducts
- Gas piping
- Fireplace doors and dampers

MECHANICAL CODE CHECKLIST

FOR ROUGH INSPECTION OF RESIDENTIAL OCCUPANCIES UMC 2000

1. Check office permit work sheet or fee table for scope of work covered by permit.
2. Review plans at office or field to verify job address, location and scope of work, Title 24 CF-1R and MF-1R forms are completed and included on the plans.

A. GENERAL REQUIREMENTS

ITEM	SOURCE
1. HVAC systems to comply with approved plans	[Title 24 CF - 1R]
2. Installation of appliances per listing	[304.1]
3. Ducts installed, supported, sealed and insulated	[604] - [605] - [Table 6-4,6-5] - [Title 24]
4. Combustion air openings, sources, ducts	[702] - [703]- [704] - [Table 7-1]
5. Gravity venting systems - length, pitch, clearances and termination	[805] - [806] - [807] - [Table 8-1]
6. Common venting system, connectors	[809] - [815]
7. Condensate removal	[310.0] - [1106.10]

B. SPECIFIC REQUIREMENTS

1. UNDER FLOOR INSTALLATION OF FORCE AIR UNIT (FAU)

a. Access opening, large enough to remove the largest piece, but not less than 30" x 30"	[909.2]
b. Unobstructed passageway large enough to remove the largest piece, but not less than 30" x 30"	[909.2]
c. Passageway no more than 20' in length	[909.2]
d. Clearance to ground min. 3" if on slab or 6" if suspended	[909.3] - [909.4]
e. Working space min. 30" x 30" at front	[909.2]
f. Ducts min. 4" clearance to ground, supported, insulated	[604] - [605]
g. Return and supply air requirements	[602] - [605] - [906] - [907]
h. Electrical disconnect, service receptacle, illumination	[909.5]

2. EQUIPMENT IN ROOMS

Access door and unobstructed passageway min. 24" wide and large enough to permit removal of the largest equipment in such room	[903.0]

3. GARAGE INSTALLATION OF FORCE AIR UNIT (FAU)

a. Access / service working space min. 30" in width and height of appliance	[903.0]
b. Equipment which has a flame, spark or glowing ignition source shall be elevated min. 18" above floor in garages and group H Divisional 4 Occupancies	[308.0] - [911.5]
c. Protection from damage	[308.0]
d. Ducts in garage min. 26 gal. metal	[UBC 302.4]
e. Ducts / plenums supported and insulated	[604] - [605]
f. Return and outside air/air supply located and sized	[906.3] - [907.1]

MECHANICAL CODE CHECKLIST

FOR ROUGH INSPECTION OF RESIDENTIAL OCCUPANCIES UMC 2000 continued

ITEM **SOURCE**

4. CLOSET OR ALCOVE INSTALLATION OF FORCE AIR UNIT (FAU)

a. Access door or opening and unobstructed passageway min. 24" wide and large enough to permit removal of the largest appliance ..... [903.0]

b. Space to be min. 12" wider than furnace with min. working space of 3" along sides, back and top (see exception for replacements) ..... [904.1]

c. Clearance along combustion chamber opening side to be min. 6" ..... [904.7]

5. ATTIC INSTALLATION OF FORCE AIR UNIT (FAU)

a. Access opening large enough to remove the largest piece, but not less than 30" x 30" (see exception) ..... [908.0]

b. Unobstructed passageway large enough to remove the largest piece, not less than 30" x 30" ..... [908.0]

c. Unobstructed passageway not more than 20' in length with solid flooring min. 24" wide ..... [908.0]

d. Level working platform min. 30" x 30" located in the front of the entire fire box ..... [908.0]

e. Permanent electrical outlets and lighting, switched at access opening ..... [908.0]

6. FACTORY-BUILT FIREPLACES, VENTED DECORATIVE GAS APPLIANCES AND LOG LIGHTERS

a. Installation per manufacturer's instructions ..... [304.17] - [911.0] - [912.1.1]

b. Fireplace combustion air requirements ..... [Title 24]

c. Hearth extension protection per listing for fireplace ..... [304.1]

d. Installation and construction requirements of vents and chimneys per listing ..... [803]

e. Approved gas logs installed in solid fuel burning fireplace ..... [912.1]

f. Approved gas-fired log lighters installed per listing ..... [304.1]

7. VENTILATION AT BATHROOMS, LAUNDRY ROOM, KITCHEN

a. Is openable window of correct size provided for ventilation? If not, is there a mechanical exhaust fan? ..... [UBC 1203.3]

b. Is there a domestic range vent? If so, check for approved exhaust duct material support and backdraft damper ..... [504]

c. Verify exhaust duct terminations for approved locations regarding openings into building and property line ..... [504.5]

8. DOMESTIC CLOTHES DRYER

a. Check moisture exhaust duct for proper material, connections and backdraft damper ..... [504.3]

b. Check length is 14' or less with two elbows. If not, verify manufacturer's listing and installation instructions or size with calculations ..... [504.3.2.2]

c. If located in closet, provide min. 100 sq. inch of makeup air ..... [504.3.2]

d. Check exhaust duct termination in approved location ..... [504.5]

MECHANICAL CODE CHECKLIST

FOR FINAL INSPECTION OF RESIDENTIAL OCCUPANCIES

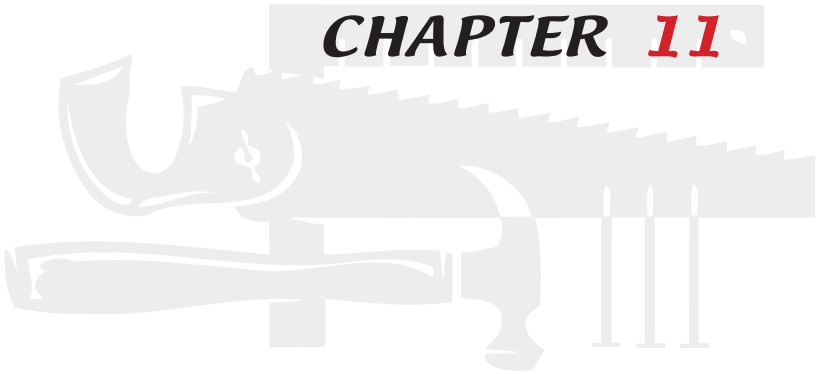
	ITEM	SOURCE
1.	All heating and cooling equipment to meet California Title 24 *A.F.U.E. and *S.E.E.R requirements	[SEE CF - 6R]
2.	Equipment supports and restraints	[304.4]
3.	Thermostat to meet California Title 24 requirements	[See MF - 1R]
4.	Combustion air requirements to all force air unit equipment	[701]
5.	Return/supply air in approved location (including any outside air as required in sound report)	[906] - [907]
6.	Appliances connected to their vents with approved material and clearances from combustibles	[801]
7.	Vents terminate above roof with proper caps and in approved location	[806]
8.	Multiple appliance venting system requirements	[809]
9.	Vented wall furnace requirements	[807]
10.	Condensate piping connections terminating at approved location	[310.0] - [1106.10]
11.	Appliance gas piping and connectors	[1311] - [1312]
12.	Gas piping sealed into fireplace hearth	[912.1]
13.	Damper locked open in fireplace with gas log	[912.1.2]
14.	Fireplace glass doors installed per Title 24	[MF-1R]
15.	Vented decorative appliance installations	[912.0]
16.	Domestic range vents	[504.2]
17.	Clearances to combustibles provided for domestic range and cook top unit	[917.1]
18.	Installations of listed cooking appliance or microwave oven	[917.3]
19.	Domestic open-top broiler units and hoods	[918.0]
20.	All exhaust air ducts to terminate in approved locations	[504.5]
21.	Backdraft dampers provided in exhaust systems	[504.1]
22.	Clothes dryer min. 4” moisture exhaust duct and makeup air requirements	[504.3.2]

A.F.U.E.** ***Annual Fuel Utilization Efficiency is a measure of the percentage of heat from the combustion of gas or oil that is transferred to the space being heated during a year, as determined using the applicable test method in the Appliance Efficiency Regulations.

S.E.E.R.** ***Seasonal Energy Efficiency Ratio is the total cooling output of a central air conditioned in BTUs (British Thermal Units) during its normal usage period for cooling divided by the total electrical energy input in watt-hours during the same period, as determined by using the applicable test method with Appliance Energy Regulations.

PLUMBING CHECKLIST

CHAPTER 11



this chapter

ROUGH INSPECTION ~

- Water distribution systems
- Drain, waste & vent systems
- Gas Piping

FINAL INSPECTION ~

- Water distribution, drain, waste and vent systems
- Gas piping
- Vents and Ducts
- Gas piping
- Fireplace doors, dampers

WATER HEATER ~

- Water heaters anchored
- Pressure relief valves
- Where gas fired water heaters are not allowed

CHECKLIST FOR ROUGH INSPECTION

RESIDENTIAL DWELLING UPC 2000

1. Check job address on approved plans and job location.
2. Verify if plumbing permit is on-site and scope of work on work sheet.
3. Review plans including special requirements of loop vents, pressure regulators, thermal expansion tanks, etc..

ITEM	SOURCE
A. WATER DISTRIBUTION SYSTEMS	
1. System under test	[609.4]
2. Verify material	[604.1]
a. Depth of water distribution system outside a building	[609.2]
3. Sizing of pipe	[610.0]
a. Supports for pipe	[314.1] - [Table 3.2]
4. No direct burial in concrete	[313.2]
a. Minimum type L with wrought fittings brazed	[604.2] - [609.3.2]
B. DRAIN, WASTE & VENT SYSTEMS	
1. System under test	[712.2]
2. Material and sizing	[701.1] - [703] - [Table 7-5]
a. Grade of horizontal drainage piping	[708.0]
3. Traps and trap arm sizes and lengths	[1003.3] - [Table 7-3]
4. Correct vent and drainage fittings	[706] - [707] - [903]
5. Island sink installed per this section	[909]
6. Supports	[Table 3-2] - [314.1]
7. Laundry room piping	[804.1.2]
8. Kitchen:	
a. Dishwasher waste/garbage-disposal discharge	[405.4]
b. Island vent-use approved diagram	[909] and UPC Training Manual
9. Bathroom:	
a. Shower	
1. Shower pan construction	[412.6]
2. Shower pan size	[412.7]
3. Shower mixer must be thermostatic or pressure balance type	[420.0]
b. Toilet clearances, fastening	[408.3] - [408.5]
c. Tub	
1. Access panel minimum 12 in. x 12 in. for concealed slip joint	[405.2]
d. Clean-out locations	[707.4.7]
1. Access and size	[707.9.10 - Table 7-6]
e. Clean-out exceptions	[707.4 - ex.1 - ex.2 - ex.3]

CHECKLIST FOR ROUGH INSPECTION

OF DWELLING UPC 2000 continued

ITEM **SOURCE**

B. DRAIN, WASTE & VENT SYSTEMS (CONTINUED)

10.Vent sizing & locations ..... [904.0] - [905.2-.4]
11.Clearances at termination of vents ..... [906.1-.2]
12.Vertical wet vents ..... [908.1.2]
13.Water heater access ..... [511.0-.5]
a. Location ..... [509]
b. Pressure & temperature-relief line ..... [608.5]

C. GAS PIPING

1. Review and drawings for gas calculations and sizing ..... [103.2-.2]
2. Gas pipe sizing ..... [1217.1] - [Table 12-3]
3. Gas test-10psi ..... [1204.3.2]
4. Material underground and above ground ..... [1210.1] - [1211]
5. Underground depth ..... [1211.5-.7]
6. Shutoff valves & location & use ..... [1211.16-.18]
7. Unions location & use ..... [1211.13]

CHECKLIST FOR FINAL INSPECTION

ITEM **SOURCE**

A. WATER DISTRIBUTION, DRAIN, WASTE AND VENT SYSTEMS

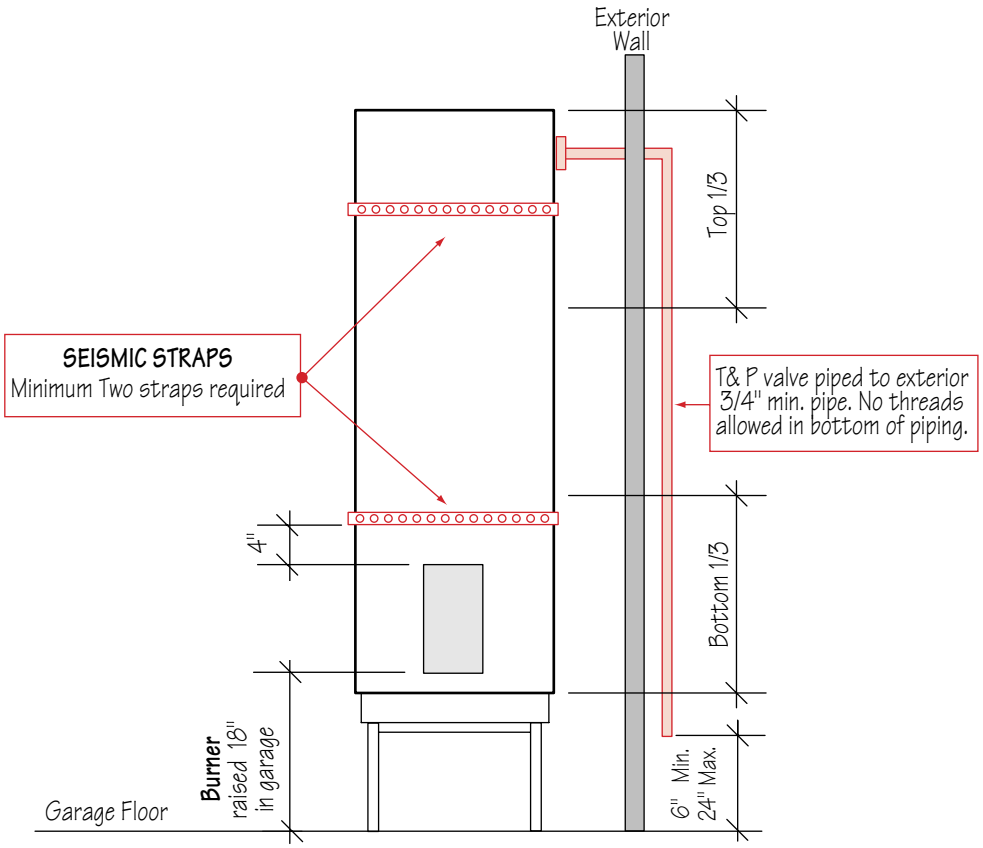
1. Fullway valve at building ..... [605.2]
2. Fullway valve at water heater ..... [605.2]
3. Fullway valve access ..... [605.6]
4. Cross connection control:
   - a. Hose bibb vacuum breaker (ex clotheswasher) ..... [603.4.7]
   - b. Pull-out hose spray faucets at kitchen and/or shower ..... [603.4.8]
   - c. Dishwasher waste air gap ..... [807.4]
   - d. Irrigation system ..... [603.4.6]
   - e. Water heater T & P drain ..... [608.5]
5. Back flow inspection devices ..... [Table 6-2]
6. Water pressure regulator with or without thermal expansion bypass ..... [608.3]
7. Water control valves for each fixture / appliance ..... [605.5,.6]
8. Bathroom:
   - a. Access to tub waste and overflow if slip joints used ..... [405.2]
   - b. Tub hose attachments req. vacuum breaker ..... [603.4.8 & 603.4.12]
   - c. Shower door size ..... [412.6]
9. Kitchen:
   - a. Dishwasher air gap required above sink flood rim ..... [807.4]
   - b. Sink-hose attachments require vacuum breaker ..... [603.4.8]
10. Outdoors:
    - a. ABS vents protected with latex paint ..... Installation standard 9-95, Appendix (i), Section - [313.3]
    - b. Vacuum Breakers at all hose bibbs ..... [603.4.7]
11. General:
    - a. Unions must be within 12 in. ..... [609.5]
12. Water heaters:
    - a. Hot and cold piping insulated within 5 ft. ..... [Cal.Tit 24 - Cal. 123a]
    - b. Insulate all hot recirculation pipes ..... [Cal Title 24]
    - c. Location ..... [509 - 510.1 - .3, & .7]
    - d. Access ..... [511.0 - .5]
    - e. Pressure & temperature-relief line ..... [608.5]
13. Water Hammer, required with quick acting valve ..... [609.10]

B. GAS PIPING

8. Gas meter access opening ..... [1209.5]
9. Individual appliance shutoff valves ..... [1211.18]
10. Gas-appliance connector:
    - a. Size ..... [1212.0 Exc.1,4] - [Table 12-9, 12-10]
    - b. Locations ..... [1212 ex.2, .3, .5 & .7]

WATER HEATER

COMMON CONSTRUCTION ERRORS	DESCRIPTION / DISCUSSION
WATER HEATERS MUST BE STRAPPED (PER 1997 UBC).	In seismic zones 3 & 4, water heaters shall be anchored or strapped to resist movement during an earthquake. Straps to be installed at the upper and lower third of the water heater (lower strap 4" above the controls). The straps shall be connected so that the fasteners and straps cannot dislodge or loosen. Code does not address smaller size water heater (i.e., 5 to 15 gallons). *Refer to Section 510.5 UPC and OSA*
PRESSURE RELIEF VALVES MUST EXTEND TO THE OUTSIDE (PER 2000 UPC).	Relief valves shall drain to the exterior of the building or other approved location. Some municipalities accept the garage as outside the dwelling. If the water heater is located in the garage, they would allow the piping to terminate 6 to 24“ above the slab. Check with local building department for the required discharge point. *Refer to Section UPC 608.2*



Note:
No gas - fired water heater allowed in bedrooms, bathrooms, clothes closet or any space opening into a bedroom or bathroom.

FIG. Z - WATER HEATER

NOTES

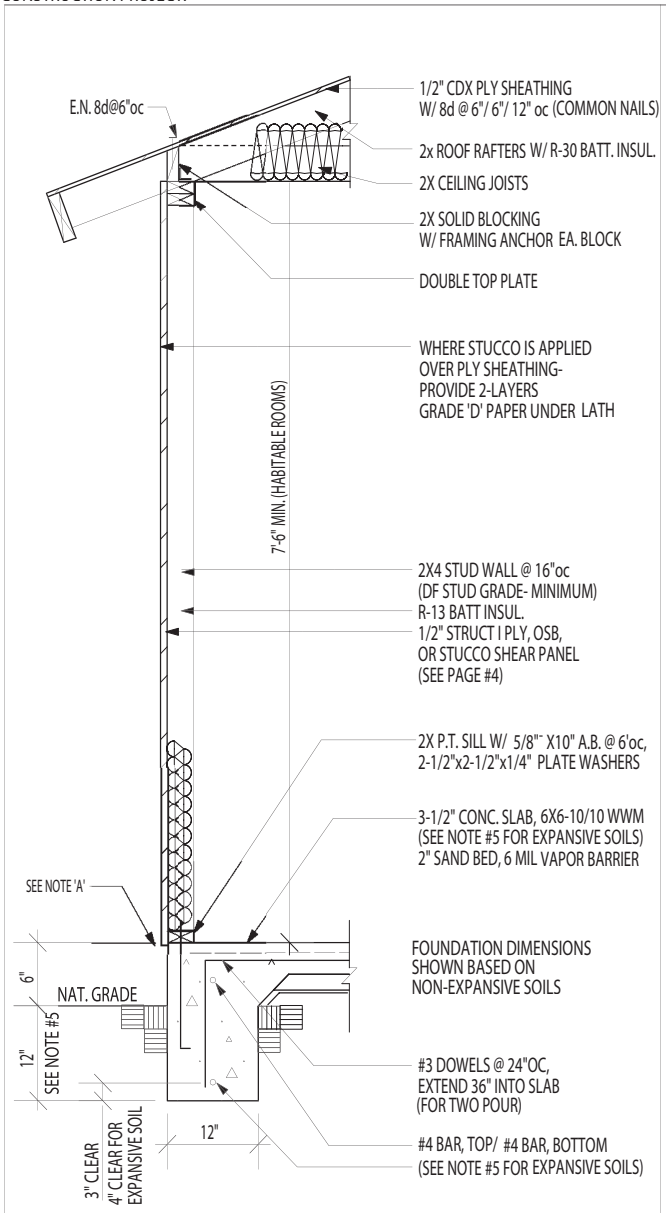
APPENDIX

CHAPTER 12

this chapter

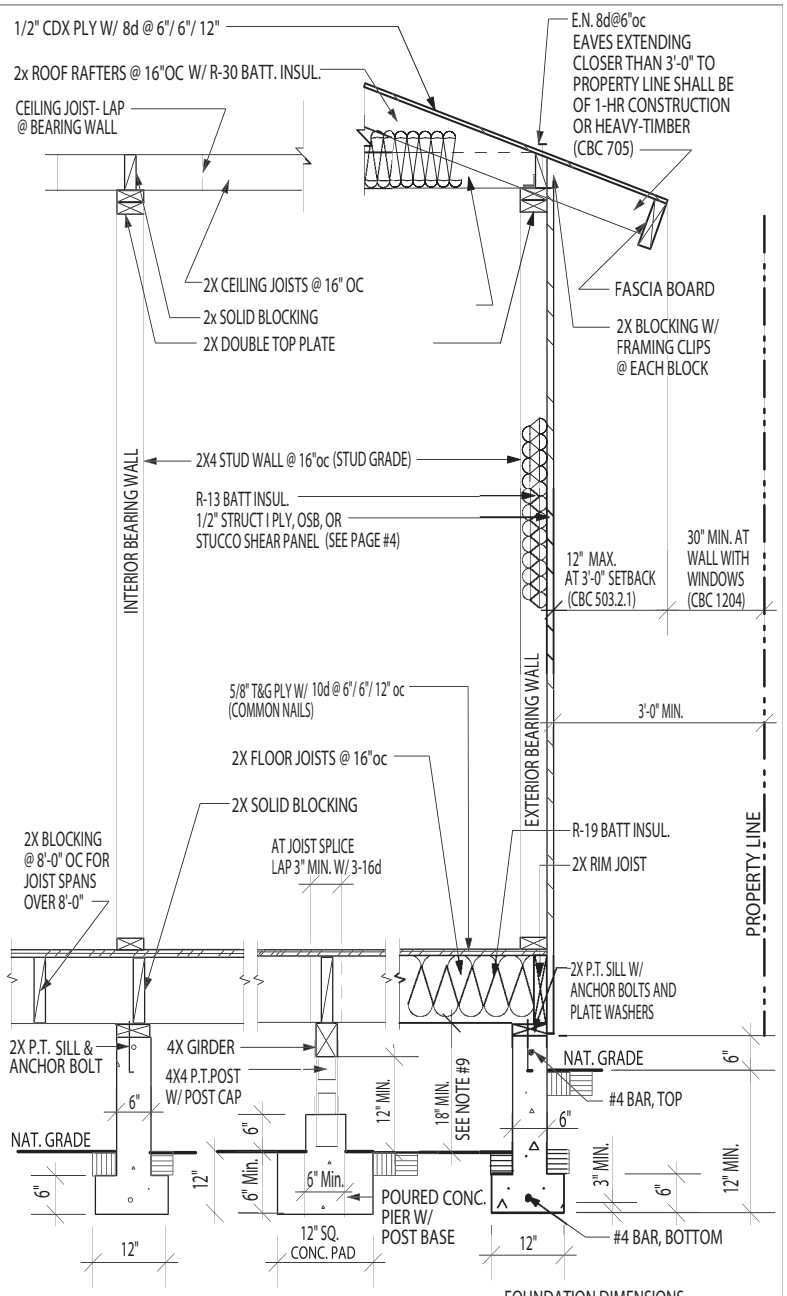
- Slab - on grade - raised floor construction
- Allowable spans - nailing schedule
- Roofing details
- Wall details
- Window details
- Residential requirements

TYPE V CONSTRUCTION IS A CLASSIFICATION OF BUILDINGS BY CONSTRUCTION MATERIALS AND METHODS. IT IS THE LEAST RESTRICTIVE PERMITTED BY THE UNIFORM BUILDING CODE AND INCLUDES LIGHT, WOOD-FRAME CONSTRUCTION. THIS SHEET IS FOR INFORMATION AND REFERENCE ONLY AND IS NOT A SUBSTITUTE FOR ACCURATE DRAWINGS PREPARED FOR EACH PROPOSED CONSTRUCTION PROJECT.



NOTES: A. STUCCO SHALL BE PROVIDED WITH A CORROSION-RESISTANT WEEP SCREED.

WALL SECTION: SLAB-ON-GRADE CONSTRUCTION



WALL SECTION: RAISED FLOOR CONSTRUCTION

FOUNDATION DIMENSIONS SHOWN BASED ON NON-EXPANSIVE SOILS

1. Anchor bolts: 5/8"x10" embedded 7" and spaced 6'-0"oc with 2-1/2"x2-1/2"x1/4" plate washers, with minimum 2 anchor bolts per piece, located not more than 12" or less than 7 bolt diameters from each end of the piece.
2. All foundation plates or sills and sleepers on a concrete or masonry slab, which is in direct contact with earth, and sills that rest on concrete or masonry foundations, shall be pressure treated wood.
3. Minimum Concrete Strength: 2500 psi.
4. Bearing walls and braced wall panels require continuous footings.
5. FOR EXPANSIVE SOIL: Refer to local jurisdiction requirements
6. Where interior walls are shear wall panels, wall framing and sheathing shall extend to the roof sheathing.
7. Under floor areas shall be ventilated by approved mechanical means or by openings into the under-floor area walls. Such openings shall have a net area of not less than 1 square foot for each 150 square feet of under-floor area. Openings shall be located as close as possible to corners and provide cross ventilation. the openings shall be approximately equally distributed along the length of at least two sides. Corrosion resistant mesh w/ Minimum 1/4" openings.
8. Enclosed attics and enclosed rafter spaces shall have cross ventilation for each separate space. The net free ventilating area shall not be less than 1/150 of the area of the space ventilated. The openings may be 1/300 of the area provided 50% of the opening area is provided with ventilators in the upper portion at least 3' above the eave or cornice with the balance of the ventilators provided by eave or cornice vents. Provide baffles to prevent attic insulation from blocking eave vents. (CBC 1505.3)
9. For stem walls greater than 24" high: Refer to local jurisdiction requirements.

ALLOWABLE SPANS FOR DF #2 ROOF RAFTERS (DF-LARCH)

Light Dead Load (up to 15 psf)/
Max. Roofing Load: 6 psf (Asphalt Shingles)
Live Load: 20 psf

RAFTER SIZE	SPACING	ALLOWABLE SPAN
2x6	24" 16" 12"	8'-8" 10'-8" 12'-4"
2x8	24" 16" 12"	11'-0" 13'-5" 15'-6"
2x10	24" 16" 12"	14'-0" 17'-2" 19'-10"
2x12	24" 16" 12"	17'-0" 20'-10" 24'-1"

ALLOWABLE SPANS FOR DF #2 CEILING JOISTS (DF-LARCH)

Dead Load: 10 psf/ Live Load: 10 psf

JOIST SIZE	SPACING	ALLOWABLE SPAN
2x4	24" 16" 12"	9'-10" 11'-3" 12'-5"
2x6	24" 16" 12"	15'-6" 17'-8" 19'-6"
2x8	24" 16" 12"	20'-5" 23'-4" 25'-8"
2x10	12"	26'-0"

ALLOWABLE SPANS FOR DF #2 FLOOR JOISTS (DF-LARCH)

Light Dead Load (up to 10 psf)
Max. Flooring Load: 1.5 psf (Carpet orVinyl)
Live Load: 40 psf

JOIST SIZE	SPACING	ALLOWABLE SPAN
2x6	24"* 16" 12"	8'-6" 9'-9" 10'-9"
2x8	24"* 16" 12"	11'-3" 12'-10" 14'-2"
2x10	24"* 16" 12"	14'-4" 16'-5" 17'-4"
2x12	24"* 16" 12"	17'-5" 19'-11" 21'-11"

ALLOWABLE SPANS FOR DF #1 FLOOR GIRDERS (DF-LARCH)

Max. Floor Dead Load: 15 psf Max. Tributary Width: 8'-0"

SPAN		GIRDER SIZE
PARTITIONS	NO PARTITIONS	
5'-3"	5'-8"	4x6
6'-10"	7'-4"	4x8

ALLOWABLE SPANS FOR DF#1 HEADERS (DF-LARCH)

Maximum span of tributary load: 20'-0"

SPAN	BEAM SIZE
Up to 4'-0"	4x4
4'-1" to 6'-0"	4x6
6'-1" to 8'-0"	4x8
8'-1" to 10'-0"	4x10
10'-0" to 12'-0"	4x12*

* 4x12 DF No.1 may be used over a 16'-0" garage door in one-story garages without ceilings or open patio or carport structures.

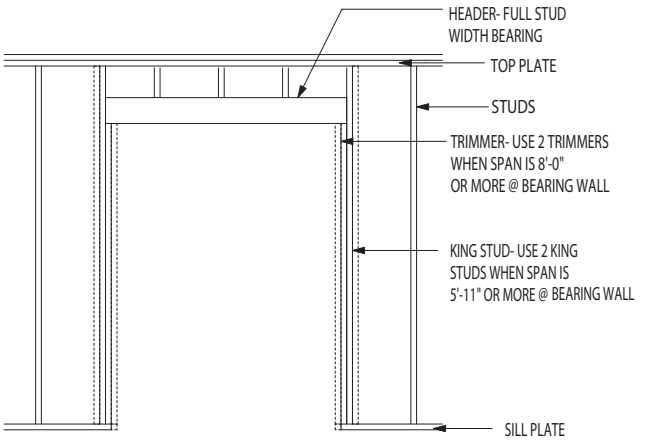
ALLOWABLE SPANS FOR PLYWOOD OR OSB FLOOR AND ROOF SHEATHING CONTINUOUS OVER TWO OR MORE SPANS-PERPENDICULAR TO SUPPORTS

NOTE: APPLIES TO PANELS 24" OR WIDER (UBC SEC. 2312)

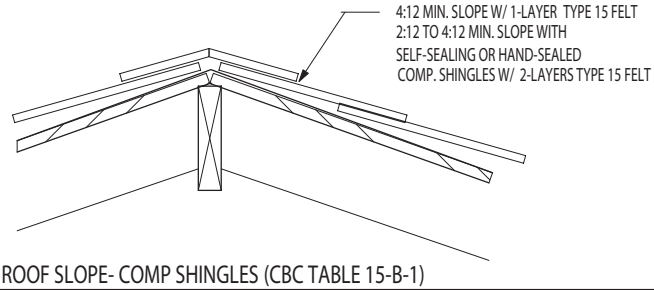
SHEATHING GRADES		ROOF				FLOOR
SPAN RATING	SPAN THICKNESS	MAX. SPAN (IN)		LOADS (PSF)		MAX. SPAN (IN)
Floor/Roof Span		EDGE SUPPORT (2X BLOCKING)	NO EDGE SUPPORT FOR 1/2", MAX. SPAN +24"	TOTAL LOAD	LIVE LOAD	Panel edges with tongue and groove joints or with blocking
24/0	7/16, 1/2	24	20	40	30	
24/16	7/16, 1/2	24	24	50	40	16
32/16	15/32, 1/2, 5/8	32	28	40	30	16
40/20	19/32, 5/8, 3/4, 7/8	40	32	40	30	20
48/24	23/32, 3/4, 7/8	48	36	45	35	24

NAILING SCHEDULE (CBC TABLE 23-II-B-1)

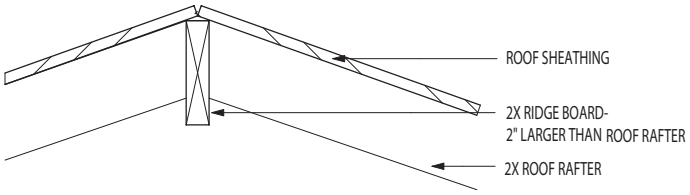
JOIST TO SILL OR GIRDER, TOE NAIL	3-8d
BRIDGING TO JOIST, TOENAIL EACH END	2-8d
SOLE PLATE TO JOIST OR BLOCKING, TYPICAL FACE NAIL	16d @ 16"oc
SOLE PLATE TO JOIST OR BLOCKING, AT BRACED WALL PANELS	3-16d per 16"
TOP PLATE TO STUD, END NAIL	2-16d
STUD TO SOLE PLATE	4-8d, TOENAIL, OR 2-16d, END NAIL
DOUBLE STUDS, FACE NAIL	16d @ 24" oc
DOUBLE TOP PLATES, TYPICAL FACE NAIL	16d @ 16" oc
DOUBLE TOP PLATES, LAP SPLICE	8-16d
BLOCKING BETWEEN JOISTS OT RAFTERS TO TOP PLATE, TOENAIL	3-8d
RIM JOIST TO TOP PLATE, TOENAIL	8d @ 6" oc
TOP PLATES, LAPS AND INTERSECTIONS, FACE NAIL	2-16d
CEILING JOISTS TO PLATE, TOENAIL	3-8d
CONTINUOUS HEADER TO STUD, TOENAIL	4-8d
CEILING JOISTS, LAPS OVER PARTITIONS, FACE NAIL	3-16d
CEILING JOISTS TO PARALLEL RAFTERS,FACE NAIL	3-16d
RAFTER TO PLATE, FACE NAIL	3-8d
BUILT-UP CORNER STUDS	16d @ 24" oc
2" PLANKS	2-16d @ EACH BEARING



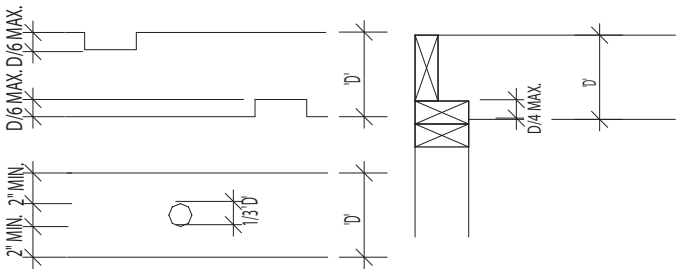
HEADER/ LINTEL (CBC 2320.11.6)



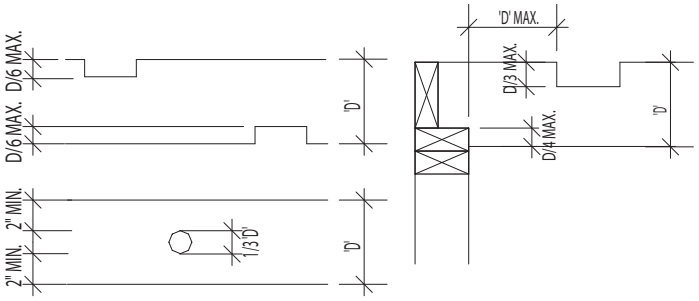
ROOF SLOPE- COMP SHINGLES (CBC TABLE 15-B-1)



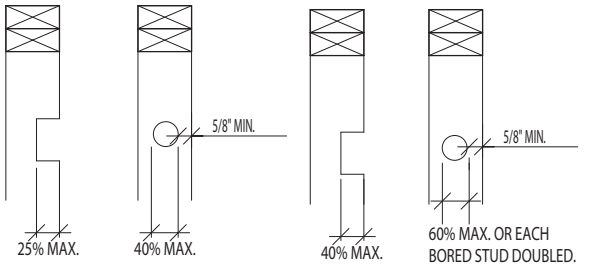
RIDGE (CBC 2320.12.3)



NOTCHING & BORING FLOOR JOISTS
(NOTCHING NOT PERMITTED IN MIDDLE 1/3 OF JOIST SPAN)



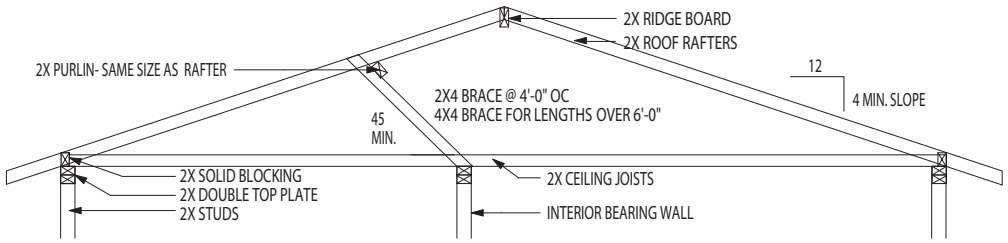
NOTCHING & BORING RAFTERS & CEILING JOISTS
(NOTCHING NOT PERMITTED IN MIDDLE 1/3 OF RAFTER OR JOIST SPAN)



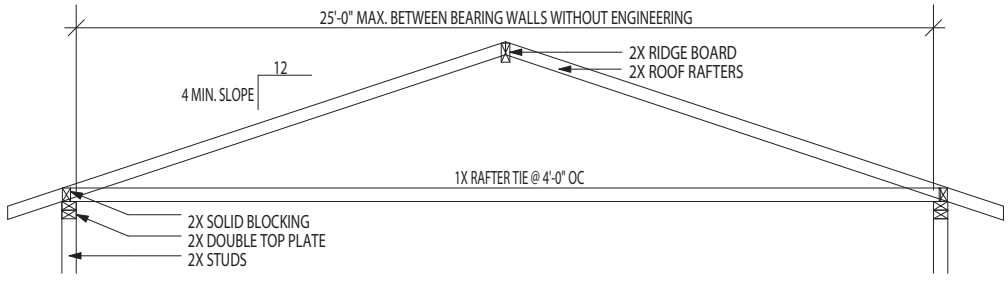
BEARING PARTITIONS

NON-BEARING PARTITIONS

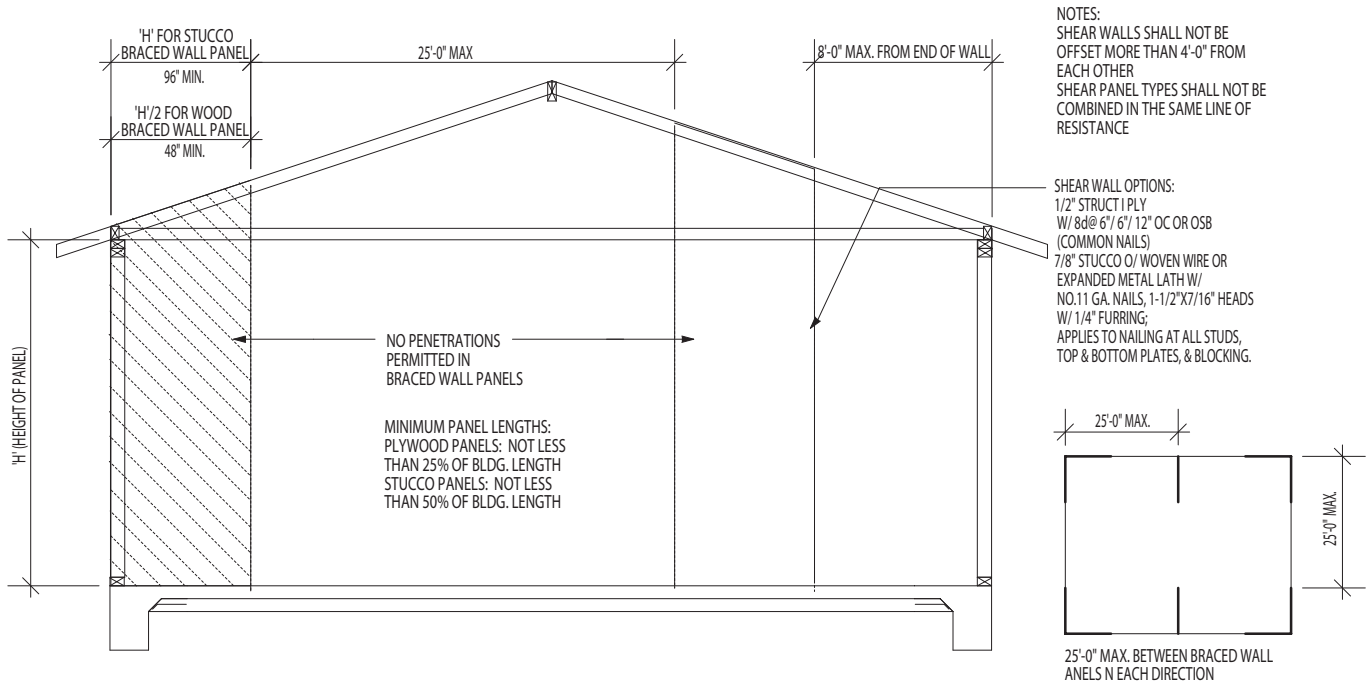
NOTCHING & BORING:
WALL STUDS (CBC 2320.11.9/ 2320.11.10),
RAFTERS/CEILING JOISTS (CBC 2320.12.4)
FLOOR JOISTS (CBC 2320.8.3)



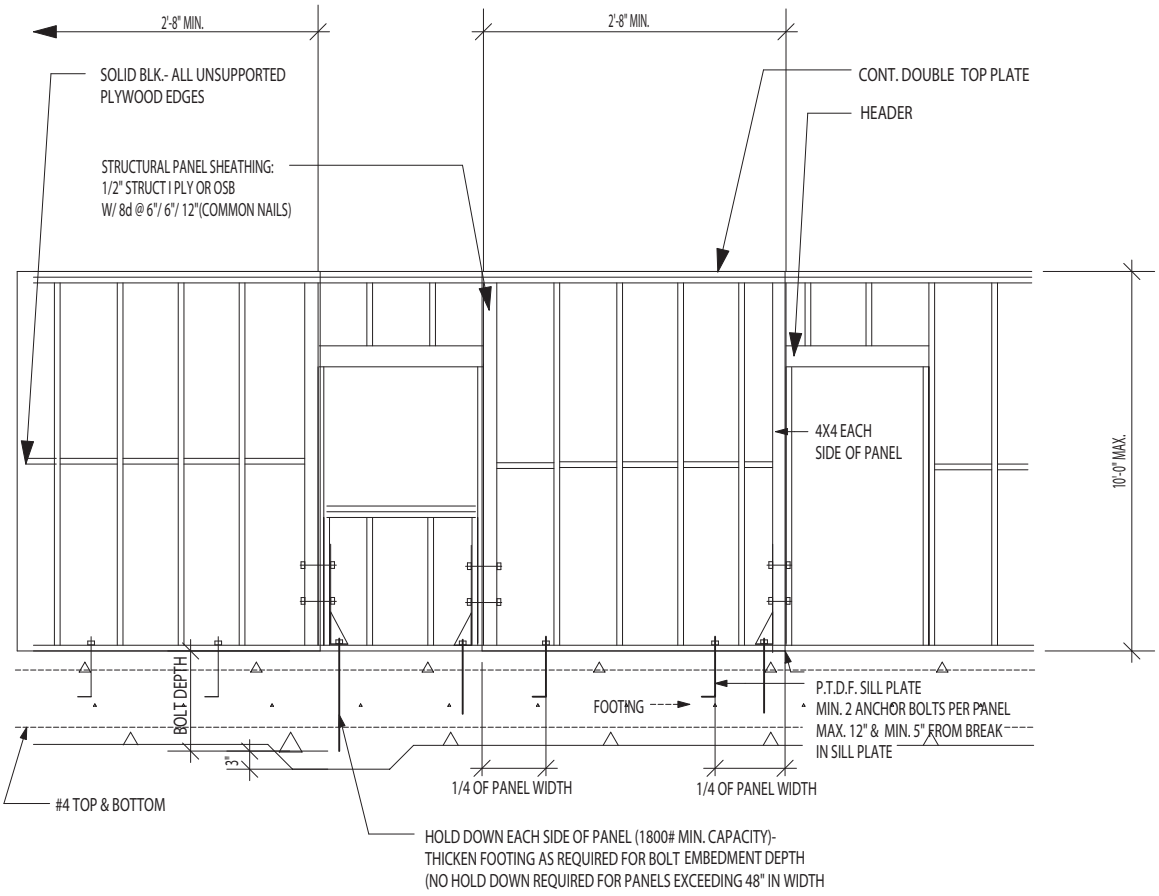
PURLINS (CBC 2320.12.7) (FOR ROOF PITCH NOT LESS THAN 4 VERTICAL TO 12 HORIZONTAL)



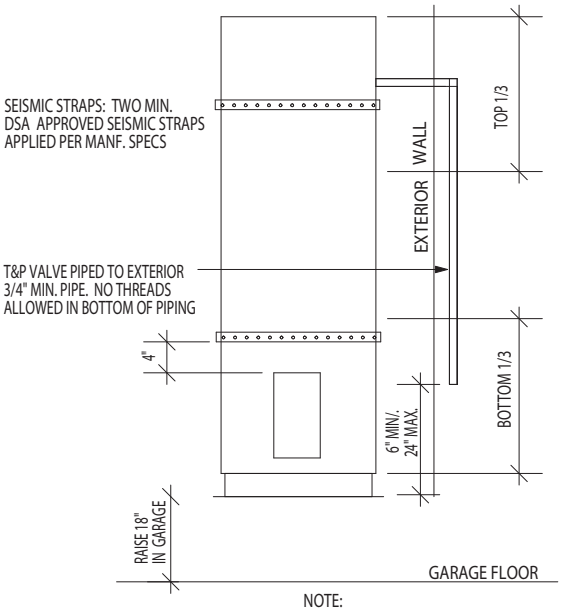
RAFTER TIES (CBC 2320.12.6)



STANDARD BRACED WALL PANELS (CBC 2320.11.3)

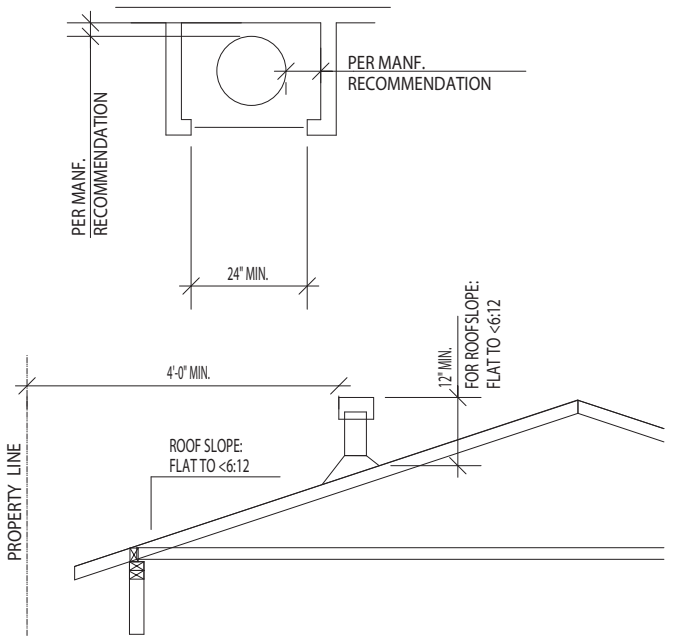


ALTERNATE BRACED WALL PANEL (CBC 2320.11.4
1-STORY,'U' OCCUPANCY ONLY (PRIVATE GARAGES, SHEDS, & AGRICULTURAL BUILDINGS)



NOTE:
NO GAS-FIRED WATER HEATER ALLOWED IN BEDROOMS, BATHROOMS, CLOTHES CLOSETS, OR ANY SPACE OPENING INTO A BEDROOM OR BATHROOM.

WATER HEATERS



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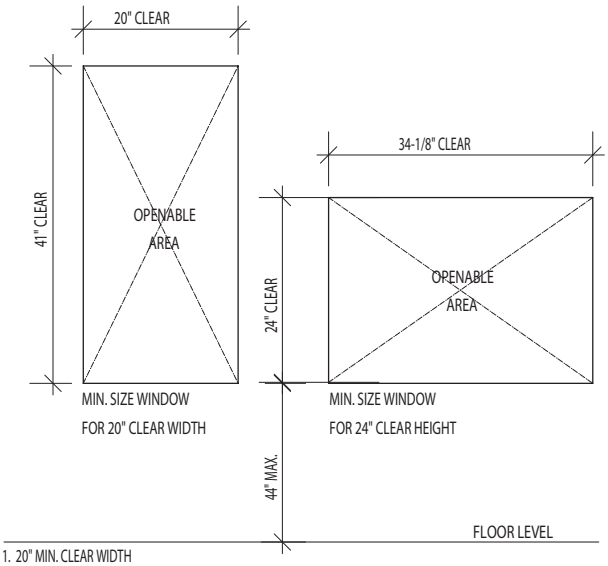
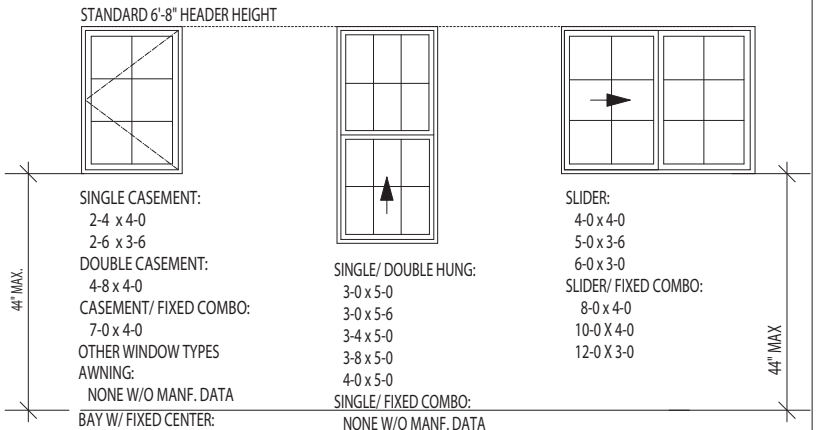


1. 20" MIN. CLEAR WIDTH
2. 24" MIN. CLEAR HEIGHT
3. 5.7 SF MIN. OPENABLE AREA

EMERGENCY ESCAPE/ EXIT WINDOW (CBC 310.4)

THE FOLLOWING WINDOW SIZES WILL BE THE MINIMUM ALLOWED FOR EGRESS UNLESS MANF. DATA IS SUPPLIED



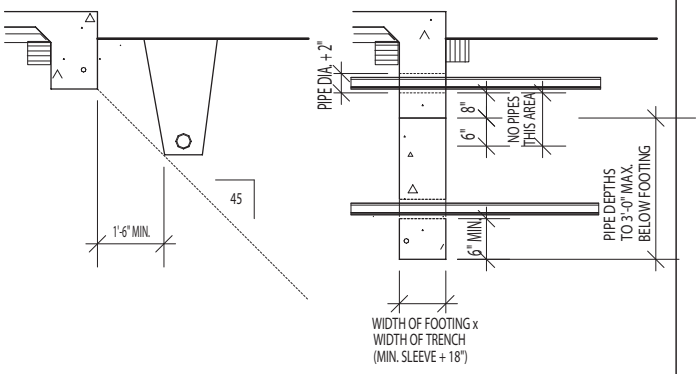
SINGLE CASEMENT:
2-4 x 4-0
2-6 x 3-6
DOUBLE CASEMENT:
4-8 x 4-0
CASEMENT/ FIXED COMBO:
7-0 x 4-0
OTHER WINDOW TYPES
AWNING:
NONE W/O MANF. DATA
BAY W/ FIXED CENTER:
NONE W/O MANF. DATA

SINGLE/ DOUBLE HUNG:
3-0 x 5-0
3-0 x 5-6
3-4 x 5-0
3-8 x 5-0
4-0 x 5-0
SINGLE/ FIXED COMBO:
NONE W/O MANF. DATA

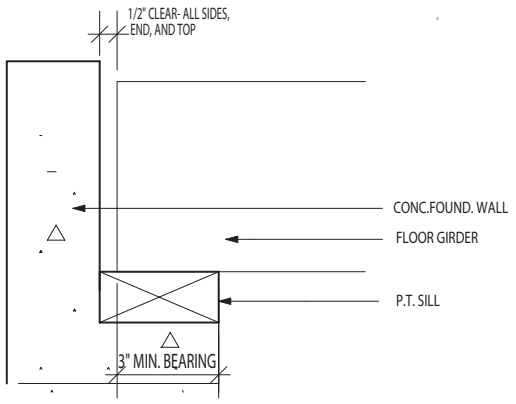
SLIDER:
4-0 x 4-0
5-0 x 3-6
6-0 x 3-0
SLIDER/ FIXED COMBO:
8-0 x 4-0
10-0 X 4-0
12-0 X 3-0

NOTE: SIZES ARE TAKEN FROM DATA SUPPLIED BY WINDOW MANUFACTURERS, HOWEVER THESE ARE GENERAL DIMENSIONS. IT IS THE OWNERS RESPONSIBILITY TO VERIFY THAT THE ACTUAL WINDOWS INSTALLED MEETTHE MINIMUM EGRESS REQUIREMENTS.

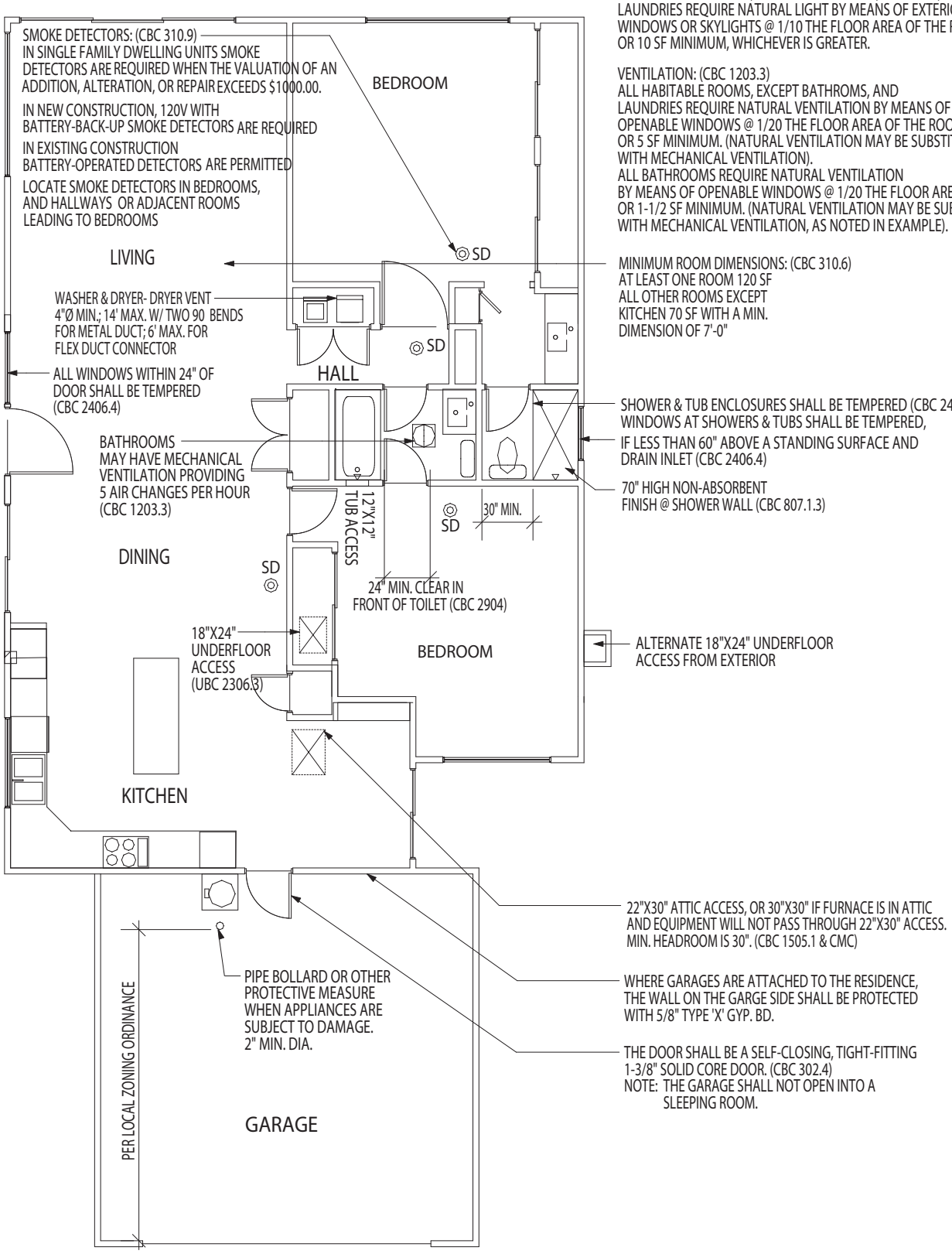
EMERGENCY ESCAPE/ EXIT WINDOW (CBC 310.4)



TRENCHES AT FOOTINGS



GIRDER (CBC 2320.7/ 2306.6)



RESIDENTIAL REQUIREMENTS